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By Thure Brandt.

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TREATMENT OF THE DISEASES OF WOMEN.

CHAPTER I.

ON THE ORIGIN AND DEVELOPMENT OF MY METHOD.

Not alone physicians but laymen surely have asked how it came about that I have devoted myself to the gymnastic treatment of female pelvic diseases—a treatment which differs so greatly from ordinary medical measures.

I might answer in brief that the experience that gymnastic treatment in general is recognized as very useful, makes the entire body stronger and healthier, and heals a number of different local affections in which medical treatment was useless, led me to infer that the same laws that applied to other parts of the body must also hold good in the treatment and cure of diseases of the pelvic organs, inasmuch as the human body is a coherent whole, whose organs exercise a mutual influence on one another.

But I will attempt to show how I was involuntarily, as it were, led further and further.

In the autumn of 1842 I took lessons in the different branches of gymnastics under the direction of Professors Branting and Georgi, at the Royal Gymnastic Central Institute of Stockholm. In 1843–44 I acted there as adjunct instructor, and was then appointed gymnast in Norrköping, where I at once took charge of the gymnastic treatment of about fifty patients, chiefly women, whose number increased with every term. During the five years in which I was engaged there, I acted as gymnast in the cold-water cure establishment of Dr. Lagberg, of Söderköping. Hence I had abundant opportunity of becoming acquainted with a number of female diseases.

In the summer of 1847 a patient called upon me for relief from a suddenly developed prolapse of the rectum. As medical aid could not be obtained at once, and I was ignorant of the medical treatment of such cases, I conceived an idea which was carried out in the following manner. I placed the patient in the bent, semi-recumbent position, pushed the right hand in the left hypogastrium deep into the pelvis, and made traction inward and upward, combined with gentle shaking. In this way I proposed to obtain a hold below the flexure of the large intestine, and thus to draw the gut mechanically upward. This succeeded so well that the gut was reduced, and has not again prolapsed. It must be mentioned, however, that the patient had accidentally acquired the prolapse shortly before on the same day. Since then I have had several opportunities, particularly in children, of curing such cases, even when chronic in character.

In 1859 I had under treatment a Miss v. Z., about 18 years old, and of small and delicate figure. About a year before she had been burned with moxæ on account of a spinal disorder, and since then had been confined to bed. During this time the menses were very profuse and sometimes lasted ten to twelve days. At that time I was unacquainted either with massage or with lifting of the uterus. I treated her with derivative movements and also with a sort of vibratory pressure, directed approximately against the ilio-sacral synchondroses; the pressure upon the large veins is, perhaps, to be regarded as the real efficient factor in this manipulation. The profuse hemorrhages soon ceased and did not return at a late period. The patient was treated for about two months, but was confined to her bed eleven years longer. Finally I succeeded in curing her by magneto-gymnastic treatment, and she subsequently married. In 1871 Dr. Sköldberg found no remains of pelvic disease. She was still alive in 1889 and, to my knowledge, had no return of hemorrhages.

In 1859 I received from Dr. Liedbeck one of his pamphlets, in which it was said that prolapse of the uterus was very common in Delekarlien, and it struck me at once that perhaps these prolapses could be cured as readily as those of the rectum. I studied Bock's "Anatomy" for about half an hour and it seemed clear to me that it must be possible, in the position of the patient indicated above, to grasp the uterus with

a similar movement of both hands—assuming that the organ had been replaced—and by traction upward to strengthen the fixing parts in such a way that the uterus, like the rectum, would remain within the pelvis. I revolved this idea and its mode of execution for more than a year and a half before I found the opportunity of realizing it.

August 10th, 1861, a patient, æt. 47 years, came under my care; she had suffered from uterine prolapsus for twenty-seven years and for the last three years had carried the prolapse in a primitive bandage of her own invention. But inasmuch as the symptoms had latterly prevented work for self-support, necessity compelled the woman to seek my aid. After a fortnight's treatment with lumbo-sacral percussion, and the above-mentioned lifting of the uterus, the patient was cured. The uterus remained within the body after the first sitting. August 10th, 1881, I saw the patient for the last time; she had remained well.

When I subsequently met Professor Hartelius and mentioned this cure, he asked me to examine carefully every patient before treatment, in the interest of science, in order to ascertain thoroughly the character of the disease and what could be effected by gymnastic measures. He assured me at the same time that this had not been done by any gymnast. Since then I have always made as careful an examination as possible prior to treatment.

A few days later (September, 1861) I began the treatment of two other patients—one of whom suffered from simple prolapsus uteri, the other also from prolapse of the anterior vaginal wall, in the shape of two large, soft prominences in front of the enlarged uterus. Each prominence was somewhat larger than the uterus itself, *i.e.*, at least the size of an orange. After treatment for a week, the vaginal prolapse had disappeared, and in both patients the lower end of the uterus could still be seen in the vulva. As the patients were compelled to do harvest work, treatment was discontinued for two weeks; it was then resumed for two weeks, until both patients were well. August 16th, 1886, I had a final report from one of the women that she had remained well so far as regards the prolapse; I also had the opportunity of examining the other patient carefully, and found the position and condition of the uterus entirely normal. Each patient had given birth to a

living child, the one during the year after treatment, the other five years later.

As a matter of course, the news of my cures rapidly spread in the vicinity and a large number of patients sought my assistance for similar affections, such as prolapse, displacements, enlargement of the uterus, etc.

It seemed evident to me that a slight falling of the womb could be relieved still more easily by the same means which had already cured a pronounced prolapse; and also that a displacement which resulted from relaxation and yielding of the parts which sustained the organ in only one direction could be relieved more readily than when all the sustaining parts were relaxed, as in prolapses; it would only be necessary to moderate and change the movements with regard to the position of the relaxation. After some time I succeeded in curing the diseases mentioned.

It had long been known that absorption could be effected in swollen parts by pressure. I attempted cautiously to use this in the lifting movements, by compressing the uterus partly between the hands, partly against the sacrum. Enlargements of the uterus were cured in this way.

In the spring of 1862 my aid was sought by a farmer's wife, who had had eight difficult labors and had suffered from involuntary micturition since her last confinement. As the urine was discharged in the normal way and not through the vagina, as in vesico-vaginal fistula, I was led to infer a weakness of the vesical sphincter. I employed sacral percussion in the supported standing position, together with pressure against the rami of the pubes in the bent, semi-recumbent position, the pressure being directed against the neck of the bladder and repeated three or four times. Half an hour later the patient returned and stated that the incontinence of urine had ceased. On the following day she claimed to be entirely well and it was with difficulty that I could persuade her to continue the treatment for a few days. Later she remained well.

Among the constantly increasing number of my patients were several who suffered from leucorrhœa and ulcerations. It seemed to me to be certain that this discharge, in so far as morbid infection could be excluded, should be interpreted as the result of a hyperæmia of the uterine mucous membrane,

and also that a discharge of a more virulent character might erode the delicate mucous membrane of the portio vaginalis and might thus produce ulceration. Hence I attempted to aid, as far as possible, the attempts of nature at spontaneous recovery, by deflecting the blood from the uterus and the interior of the pelvis, and also facilitated absorption by clamping and pressure movements. For this reason I employed daily liftings of the uterus, at the same time compressing the organ; as a matter of course I repeated definite pressures from different sides and also employed active derivative movements. These patients were also cured rapidly, at least when compared with those who were treated according to medical methods.

In 1862 I employed lifting of the uterus in order to produce more profuse menstruation, because I believed that this movement effects a more marked flow of blood to the pelvis. Instead of this, the slight hemorrhage already present disappeared forthwith, and this was repeated at the next menstrual period. Subsequently I employed this manipulation cautiously and with better success against abnormal hemorrhages. As early as 1863 I succeeded, by means of lifting of the uterus and compression, in checking a violent hemorrhage which had lasted ten to twelve days.

Experience gradually taught me that, in many cases, the liftings did not suffice to restore the uterus to its normal anterior position. I then learned by examinations in these cases that the uterus in part could be firmly adherent in various ways and toward different parts of the pelvic walls, in part that the organ was sometimes uninfluenced by the liftings, either on account of its smallness or the excessive tension of the abdominal walls.

I then realized the necessity of stretching the shortened parts. It seemed to me that, if no actual adhesion had taken place, this could be effected much more easily than, for example, extension in contracture of the knee which I had already succeeded in effecting. This opinion proved to be correct. But although the stretching could be performed very easily, it became evident later that it constituted the most dangerous part of my procedure, because, when too much force was employed, inflammation of the uterus, ovaries, or other pelvic organs might result.

The insufficiency of the uterine liftings was especially evident in posterior displacements. Hence I saw the necessity of replacing the uterus in another way. With the patient in a standing position I could reduce the uterus, through the rectum, to a certain extent. But when I then examined the patient in the bent, half-reclining posture, I found that the uterus had either fallen back entirely or, in the most favorable event, had not been restored to the normal position. This could now be done easily by bimanual manipulation.

For several years I had employed, without assistants, liftings of the uterus against diseases of the organ, and sometimes obtained surprisingly rapid and excellent results, but in the majority of cases, especially in posterior displacements, the duration of treatment was protracted for five, eight, even nine months. Hence the treatment appeared almost impracticable because very few patients had either the desire or the opportunity for such prolonged treatment.

In 1868 I treated a posterior displacement, without the desired result, for more than six months, because after each lifting the previously reduced uterus was always found to have fallen back into its old position. I then began to examine, during the lifting, the action of this manipulation upon the uterus. In a number of patients in whom liftings had been employed for various causes, I have since assured myself that the uterus either escaped to one side without being grasped or was even nearly pressed out. I thus learned the necessity and the advantage, in liftings, of using at the same time the inner support to the portio vaginalis, not alone in order to prevent the uterus from being thrown over backward but also in order to control and correct the performance of the manipulation. The treatment with the aid of an assistant thus developed spontaneously. This produced more rapid and positive effects, and I have since regarded it as a duty to my patients always to perform liftings in this way unless there was some special reason for doing them alone.

As this internal support was to be afforded during the liftings I learned at the same time to enter the vagina from the side below the patient's knee and also to make a bimanual exploration in this way.

It also appeared that the patients, apart from the pelvic disorders, suffered from a number of other diseases, such as

constipation, chronic diarrhœa, disturbances of vascular action, rush of blood to the head, etc. It was evident, in such cases, that local treatment would not secure complete recovery, unless supplemented by treatment of the entire body. I attempted to meet this indication partly by gymnastic movements, partly by mild hydropathic measures.

In 1847 I had the first opportunity, in a difficult case, of applying what I had learned in the Gymnastic Central Institute and what was known subsequently as massage. The case was one of severe disease of the knee, which was strongly flexed and almost immovable. The patient could not support himself upon the leg. By means of massage and cautious stretching of the tense parts, together with other necessary gymnastic movements, it gradually grew better and was finally cured.

Since 1863 I employed, in swellings of the pelvic parts, such as the ovaries and broad ligaments (in the beginning the location of the swelling was not diagnosed as accurately as later after I had learned to treat bimanually), fine vibratory pressures which were made with the greatest caution around the affected spot, while the liftings, with more or less pressure, were performed at that time in uterine diseases. After I had learned to use the finger internally for exploration during the liftings, this was also done in massage in which the finger could also act as a support. These vibratory pressures with the external hand against the index finger as a support have since been employed largely under the term "double pressure," and particularly in uterine affections.

In 1866 Mrs. A. P., who suffered from ovarian enlargement, came under my care. In addition to pelvic movements I employed vibratory pressures, performed through the abdominal walls; at the same time I used the exploring finger as an internal support, in order to be better able to gauge the force employed. But as I feared that the pressure would give rise to a dangerous evacuation, if pus were present in the exudation, I began to substitute, for the pressure, short light circular movements with the free finger. Subsequently, vibratory pressure or circular movements were employed (both called "double pressure"), according to circumstances, upon the uterus, the parametria, and ovaries, and the pelvic exudations. In 1874 the term massage was substituted for double pres-

sure, and since then only circular frictions have been used, with increasing and diminishing pressure.

In August, 1871, I first attempted the treatment of an extensive chronic exudation, and obtained good results. The patient in question suffered, after a puerperal peritonitis, from a hard swelling in the anterior abdominal wall, extending from the right anterior superior spinous process of the ilium obliquely downward to the left ramus of the pubis. The patient made a permanent recovery, as I was able to confirm ten years afterward.

In 1870 I succeeded for the first time in curing a prolapse of the vagina; the patient was a multipara, a young and vigorous woman. In 1873 I cured a case of prolapse of the vagina in a woman of 53 years.

In August, 1872, I began to treat a floating kidney. After my pupil, Dr. Nissen, of Christiania, had employed the treatment to advantage during the menstrual periods, I also attempted it and since 1875 have always followed this plan.

In 1877 my attention was called by Professor Voss' article to the importance of the floor of the pelvis for the position of the uterus. This led me to employ separation of the knees with the pelvis elevated; it was evident, in my own person, that this caused active tension of the muscles of the floor of the pelvis.

Although I succeeded in the majority of cases, in restoring my patients to health, it was sometimes impossible to keep the uterus, in posterior displacements, permanently in the normal position. I made various experiments, especially pressure on the nerves, modifications of the lifting movements, etc., but without attaining the desired end. Finally, in 1887 I discovered in the interrupted form of lifting an efficient remedy, and have since found that posterior displacements were as amenable to treatment as other pelvic disorders.

From the start I had been desirous of explaining clearly to the profession everything that I knew, but as they turned the cold shoulder it only remained for me to overcome opposition by continued work and the successful results. Mindful of the brevity of life and desirous of the welfare of patients, I began to teach female pupils, and began to make drawings for them to serve as guides. It was often necessary that I or my pupils should treat the patients at home where no spe-

cial gymnastic apparatus could be obtained. Hence, I accustomed my pupils to using utensils which could be found everywhere, such as chairs, tables, walls, doors, sofas, or beds.

The first gynæcologist to subject my method to an honest and unbiassed test was Dr. Sven Skœldberg. In 1871 he honored me with a visit in Skœfde, and closely followed my then treatment of sixty-three patients. Finally, I yielded to his advice and removed, in 1872, to Stockholm. Here a patient came under my care suffering from a large exudation in the left side of the pelvis, which had been treated unsuccessfully by several physicians, and had also been dismissed by Dr. Skœldberg as incurable. This patient was entirely cured by me, and has remained well for many years.

Invited by Skœldberg to hear his lectures on displacements of the uterus, I only had the opportunity of attendiing three. At his last lecture before his death, he said: "But as an operation may fail, it is a matter for congratulation that an attempt has been recently made to cure these diseases by means of gymnastics without instruments and without operation. As you know, Major Brandt has busied himself with this subject. As he is now here in order to have this matter subjected to scientific examinations, I extend, in his name, a cordial welcome to those among you who wish to take part in the investigation." His pupils did not respond to this invitation. Honor to the memory of such a man!

Since that time I was forced to wait a long time before a specialist considered my method worthy of thorough investigation. Through the instrumentality of a merchant, Mr. Robert Nobel, Dr. Paul Profanter was induced to observe my treatment for a few months in the beginning of 1886. He had a clear perception of the value of the treatment and endeavored to gain my consent to demonstrate my methods of treatment in a hospital and thus to control the results obtained. It was only his active interest and constantly repeated desire which finally induced me, at my advanced age, to go with Dr. Nissen to Jena, where we were cordially received by Prof. B. Schultze, and could operate upon a number of suitable patients, under unbiassed, constant control. It does not lie in my province to express an opinion concerning the results, but I find that, since that time, the interest in my mode of treatment is constantly increasing.

CHAPTER II.

GENERAL REMARKS.

The prerequisite of correct and rational treatment is a correct diagnosis, obtained by accurate examination of the local and general morbid conditions. But as a scientific diagnosis requires a much greater degree of knowledge than we gymnasts, as a rule, possess, we must be content with utilizing our more modest attainments and extending our powers of observation and judgment to the utmost in order to overcome the difficulties which we have to encounter.

My guiding principle is: where the vascular and nervous action is normal, there is health; this is more or less disturbed in every case of disease, whether local or general.

Hence, I endeavor to ascertain, by means of questions and objective examinations, the condition of these two functions in the different parts of the body, viz., the head, neck, arms, chest, abdomen, pelvis, thighs, and feet, and also inquire with regard to the mental condition and sleep. If the patient's statements rouse the suspicion of a local affection, a careful local examination must be made.

In the general treatment I am guided by the following considerations: We know that certain movements act upon certain parts of the body or against certain morbid conditions, furthermore that we can cause increased or diminished nutrition of the organs; the circulation of the blood is regulated by nervous activity, hence the latter should always receive the greatest attention. Mindful of these facts, I can decide on certain movements which form, as it were, the skeleton of the treatment. If the general effect in a certain direction is relatively excessive, *i.e.*, if it is injurious, I add new movements which act in another direction and thus restore the equilibrium.

Experience has taught me that better results are often obtained when, at the outset, the treatment is restricted in a

certain direction, viz., toward the part in which the nervous and vascular activity is relatively less vigorous. In some affections of the chest, for example, in which the vital action of the lower limbs is often found diminished, we first endeavor to increase the latter, and then extend more vigorous movements to the upper parts of the body.

When all is normal, I assume that vital action is efficient throughout all the extremities of the body. If this is not so, I attempt to restore this activity of the parts by different movements and often by hydropathic treatment. The latter should be very mild and used only with sufficiently high temperatures. It consists of rapid, moist frictions (never during menstruation) of larger or smaller parts of the body, followed immediately by drying with a towel without friction; the patient is then covered up in bed or is allowed to walk about after dressing.

As a rule the gymnastic daily treatment runs approximately the following course: a chest movement, movements of the limbs (the upper and lower alternately), of the trunk muscles, the inner parts of the abdomen (and pelvis), then of the head and neck, then the lower limbs, and finally a respiratory movement. Hence the local treatment of female pelvic disorders occurs immediately after the passive abdominal movements or the other trunk movements. As a matter of course, this arrangement may be changed by circumstances. Sometimes I begin with the more central parts, such as the head and back, sometimes with the extremities. If, for example, the patient suffers, apart from rush of blood to the head, from pain in the head or other symptoms in that locality, the local special treatment of all these ailments would be too protracted for one sitting. I then divide it into two or three parts, beginning, for example, with rolling of the head and arm flexion, then the neck movements after a few movements of the lower limbs, and make the most important head movements only after the abdominal and pelvic movments.

If, for example in myositis, passive absorption movements and also active movements should be employed upon the same part, the former are first employed, and the latter follow immediately afterward in order to convey fresh blood to the diseased parts. In nerve compressions, however, experience has shown that the desired stimulant action remains absent to a

greater or less extent if followed immediately by active movements. Hence the active movements are first performed, then the nerve compression.

It is only in patients who suffer from scanty menstruation, or amenorrhœa, that I induce a flow of blood to the pelvis. Otherwise it is my rule to draw the blood more or less away from the pelvis. Hence I am restricted to a much smaller number of movements than other gymnasts, and have also been compelled to modify or completely change a number of movements.

Gymnastic treatment should not be carried out immediately after meals. The best time is in the morning, a few hours after a not too hearty breakfast. I need hardly mention that an evacuation of the bowels should have been secured, if possible, before the local treatment; at all events the bladder must be emptied immediately before.

In many cases it is especially necessary to be cautious in regard to cohabitation. Experience has taught me that the husband is often at fault in this respect. If the wife is unacquainted with the danger, she is often persuaded by the husband, and serious results may follow. It is not alone barbarous, but sometimes very dangerous, not to spare the wife when inflammatory exudations are present in the pelvis.

As a matter of course, local treatment of the pelvis should only be instituted when pain or other symptoms are present; sterility forms the only exception to this rule. In many cases the true interests of the patient are not subserved by discontinuing the treatment as soon as the pains cease. It is better to continue the treatment a little longer, partly in order to obtain a possible improved position of the uterus, partly in order to be certain that the improvement is permanent. It is often found that patients who suffer from uterine displacements, attended with more or less severe pelvic disturbances; are freed from the latter after a short period of treatment, although the position of the uterus remains abnormal. The treatment might then be regarded as successful if the patients felt permanently well, but it cannot be denied that there is a tendency to relapse in such cases. For this reason I am rarely satisfied with the disappearance of the symptoms, but always attempt to restore the organ to its normal position. This is by no means always possible.

Improvement occurs very often in fits and starts, so that everything may remain unchanged for a long time, when suddenly a great improvement takes place. These changes often set in after menstruation.

With the exception of rare cases in which I was compelled to visit the patients, these have always called upon me. During my work in Jena in 1886–87, I had the opportunity of noting the great advantage of treating the patients in a hospital.

It has been believed that the entire treatment can be carried out as easily as it can be understood, but all experience teaches the contrary. How slowly does one learn to make an examination rapidly and well! When the practice necessary to make the exploration from one side has been acquired, we need merely change the position and the hands in order to find ourselves in the position of a beginner.

A discussion held in 1874, in the Norwegian Medical Society, seemed to show the readiness of some physicians to accept those parts of the treatment which can be carried out personally by the physician without an assistant, but they discountenanced my method as it then existed, *i.e.*, local treatment, aided by other movements adapted to the other conditions of the patient. Taught by long experience that women affected by genital diseases almost always suffer also from other disturbances, I would not be willing to dispense with auxiliary remedies, general movements, and hydropathic treatment.

In lifting movements of the uterus we can rarely dispense with an assistant. In stretching adhesions and in massage treatment only one person is required, and here the physician is the most suitable person, because these plans of treatment are not alone painful, but also attended with risk. But so long as physicians have not adopted this mode of treatment, it must be carried out by the laity. It is a question whether the diseases in question are not best treated by women. It has been proved by experience that a strong and skilful woman, with not too short fingers, can at least treat a small number of patients. But when the number of patients increases, the shorter fingers and lesser power of women often make it impossible for them to meet all demands. Theoretically and practically, therefore, it would be better to educate male gymnast specialists or, better still, medical specialists.

It would be a waste of valuable time, however, should the physician himself carry out the entire treatment. For this reason, also, he requires assistants, preferably female. In the selection of an assistant, special care must be taken that she possess not alone soft and sensitive hands, but also vigorous and long fingers. Although, as a rule, short fingers suffice for exploration, they become much more quickly tired during protracted work, and can thus manipulate to less advantage. In many cases the short fingers make the manipulation impossible. For example, in order to apply massage, without danger, to an exudation situated high in the pelvis, it should receive a good and sure support from below, without displacing it too vigorously with the external hand; here a long finger is indispensable. This is still more necessary in the detachment of high fixations, because we must always apply the force a little above the point of fixation. To what an extent short fingers interfere with manipulations is easily shown by the following experiment. If any morbid locality in the pelvis can just be reached for purposes of massage, the fingers are withdrawn for a certain slight distance. It will now be found that, on attempting to continue the massage, very little or nothing can be felt of what was formerly felt distinctly, and an enlargement may even seem to have disappeared. The fingers then cause mere distention of the external abdominal walls and the subjacent internal parts, so that an increased supply of blood takes place instead of absorption.

Inasmuch as women rarely have very long fingers, the physician must either carry out the treatment himself in very difficult cases or he must secure a male assistant.

With proper caution I have never observed any dangerous accidents as the result of my treatment, with the exception of the stretching of fixations, in which it has not always been impossible to gauge the force accurately. Affections of less importance have developed occasionally in lifting movements and difficult reductions. In late years I have always been able to avoid such accidents. They consist, in the first place, of small cutaneous erosions, particularly during liftings, if the application of the fingers has not been made in such a way that a sufficiently large portion of skin has been pressed down before the lifting, in order that the integument should not be stretched too tightly during the upward movement. As a matter of course these erosions soon heal.

In fat women in particular, and when the precaution just mentioned has not been adopted, very hard, circumscribed swellings as large as a hazelnut may form deep in the abdominal walls and often in the groins; the largest spots were several inches long and as thick as the thumb. At the end of a few days the patients began to make complaint of these spots, but usually stated with certainty that they had developed during this or that movement. The skin then assumed a bluish color, later became greenish and yellowish, but finally the normal color was restored. A certain degree of tenderness was present, but was not considerable. They gradually diminished and disappeared under the influence of massage. In some cases only a part of the swelling was absorbed by the massage, leaving several small, movable nodules which slowly disappeared. In only a few cases, in which the patients did not mention the existence of this condition, so that the movements were continued, did an abscess develop. It has not been necessary to interrupt treatment on account of these accidents, but the inflamed parts must not be irritated during the treatment, and hence the fingers must be placed alongside the affected parts.

I may also mention that the rapid absorption of exudates is sometimes attended by slight febrile movement.

Whether my local treatment, aided by general gymnastic movements, is preferable to the previous methods of the medical profession will be shown most certainly by unbiassed investigation and increasing experience. But we must emphasize the fact that the true value of a method can only be estimated correctly when it is carried out as fully as possible.

Professor Branting has said: "When you have given the patient the desired position and have fixed him therein, do not look at him, do not breathe over him, but only feel him." This is entirely true, but only in regard to movements of resistance. In these movements the patient, from the very beginning, should offer gentle resistance while we slowly stretch his muscles, according to our own sensations; in like manner we must offer resistance, guided by our sensations, when the patient contracts his muscles.

A very common mistake in making movements of resistance is owing to the fact that the patient makes the muscle tense.

In passive movements, on the other hand, it is as important to see what the patient can tolerate as it is to feel. If not a sound is heard and not the slightest change is visible in the face, certain movements are apt to injure the patient.

Various instruments may be used to advantage in remedial gymnastics, but it is also important that the gymnast learns to do without them in order that he may be able to treat the patient at home. The use of machines is fully justified under the proper conditions; for example, when many people are to be treated, some of whom merely require a certain amount of bodily movement in general, while others can be cured by simpler treatment. The treatment of all kinds of diseases will require very large rooms and a large number of different machines, in addition to manual treatment. At all events such machines cannot be employed in the treatment of patients who are confined to their own home.

A great flaw in machine gymnastics is the lack of certain necessary starting-positions. That some percussion and hacking movements may be performed better by machines than by the hand I freely acknowledge, especially when prolonged duration is advantageous; but, in my opinion, this is rarely the case. Moreover, the vital action of the living hand cannot be entirely denied.

CHAPTER III.

REMARKS ON THE POSITIONS OF THE PATIENT AND PHYSICIAN.

Positions of the Patient.

The position of the patient's body and her mode of movement are sometimes much more important than is generally believed. For example, I recognize a causal relation between the relaxed position of the body with the trunk sunk over forward in chlorotics and their frequent relaxed displacements of the uterus. There is an increased pressure by the superjacent abdominal organs upon the supporting ligaments of the uterus, so that the latter is more apt to fall over backward and remain in that position, especially during defecation or micturition or in lifting objects which are situated above the head.

If an individual with violent hemorrhages assumes a bent lateral decubitus, this tends to diminish the hemorrhage and to permit rest and sleep.

If we remember how readily the uterine movements respond to the changes in pressure during respiration—for example, during examination with Sims' speculum—it is not surprising that the uterine supports, when morbidly affected, are very sensitive to even slighter pressure. Pains develop during and after coughing, sneezing, from slight jolts while driving, from lifting, during certain movements, such as bending or turning the trunk, on standing up or sitting down too rapidly, on straining during defecation—conditions which produce more or less violent extension of the supporting ligaments. This sensitiveness warns the patient and prevents hyper-extension of the parts in question. A continuance of the pains is an indication that excessive stretching has taken place. Such a warning against irritating hyper-extension often occurs during the examination or treatment of the pelvic parts, the pains

being produced when the hand is introduced and indirectly stretches the parts.

The patients often complain of pains on sitting down. These result from the fact that the soft floor of the pelvis is somewhat pressed in, and thus a pressure is exerted upon the uterus from below. This results in pain, either on account of the sensitiveness of the uterus itself or of its supports. When the uterus is very much enlarged it also extends farther inferiorly (although the amount of this prolapse is sometimes not striking, on account of the coincident falling of the floor of the pelvis) and hence it is more affected by the pressure in question. If exudations, which fix the uterus more or less, are also present, the pressure from below becomes much more painful.

That such a pressure from below really produces pressure on the uterus and pains can be easily proved in many cases. For example, violent pain sometimes results when the portio vaginalis is pushed backward and upward or forward and upward. If, for example, after reduction of the uterus, the organ is held forward with the free hand, and then a not especially deep pressure is exercised upon the side of the anus, we can feel with the free hand that the pressure is conveyed to the uterus.

In different positions different muscular tensions will be necessary in order to overcome the weight of the bodily parts, and these tensions may exert an influence on diseased parts. Many patients complain of certain disturbances when they lie down or get up. These may be helped in the following way. We stand or sit at the patient's side, turned toward her head, grasp her with one hand around the neck, with the other hand on the other side of the neck between the shoulders; direct the patient to keep the neck and back stiff and to offer slight resistance, and then raise her into a sitting position until her feet reach the floor. In lying down the patient should press backward while, the grasp around the neck remaining the same as in the previous manipulation, resistance is furnished by an assistant.

The same method is employed in relaxed displacements of the uterus in order to prevent a return to the abnormal position, after reduction or lifting, by the action of the abdominal muscles in getting up.

In 1862 a patient who had suffered from severe pains associated with left lateral displacement of the uterus, was apparently cured. A trifling scoliosis was then treated by: supported standing position, lateral flexion to the left (with resistance). After a few days the old pains returned and on examination I found that the uterus was again deflected to the left. As this seemed to be due to the movements mentioned, I directed the same movements to be made by other patients (a vaginal examination being made at the same time), and also "supported, standing,—drawing backward or forward (movements of resistance)." I then found that when the patient got up after any of the movements mentioned, the portio vaginalis was drawn in the same direction; for example in raising the trunk, which had been bent forward, the portio was drawn backward.

In gymnastic movements the position employed often exerts considerable influence. For example, in the movements employed against amenorrhœa and constipation, positions are used in which the sternum and symphysis pubis are widely separated; in the former the pelvis is drawn strongly forward during the special movements. In diarrhœa and increased uterine hemorrhages, positions are employed in which the body is bent over forward, *i.e.*, the back is convex posteriorly and the hips are flexed. In many patients who suffer from pelvic disorders, pains are produced by certain movements, even on raising the trunk after it has been bent over forward, if the movement is carried out with projecting pelvis or with the back bent over backward. If the trunk is kept bent over forward during the movements, they may often be carried out without difficulty.

In the exploration and local treatment of the pelvic organs certain positions offer special advantages. In the standing position gravity forces the more movable and heavier parts of the pelvis downward, so that they can be better reached through the rectum or vagina; in this position it is also sometimes easier to make certain stretchings and to replace the retroflexed uterus anteriorly, etc. This can be done still better where the patient lies upon the abdomen, for example, upon some chairs, with the separated feet upon the floor and the pelvis projecting a little beyond the rim of the chair.

The half-reclining posture is employed very commonly,

either in the higher or lower form. In the high form, which is sometimes employed in gymnastic movements, such as, for example, the ordinary knee-separation, the patient leans back comfortably, but not very low, the legs are flexed, the feet are supported against some object about at the level of the pelvis. In the low form, the patient lies upon a sofa or long low couch, the knees and feet drawn up, the latter supported on the couch; the thorax and head, but not the entire trunk, somewhat elevated (Figs. 1 and 2). This is the best position in which to reach the abdominal and pelvic organs through the abdominal walls. When the feet are drawn as close as possible to the pelvis and cannot slide upon the couch, the loins are lowered, but the buttocks are raised and the symphysis

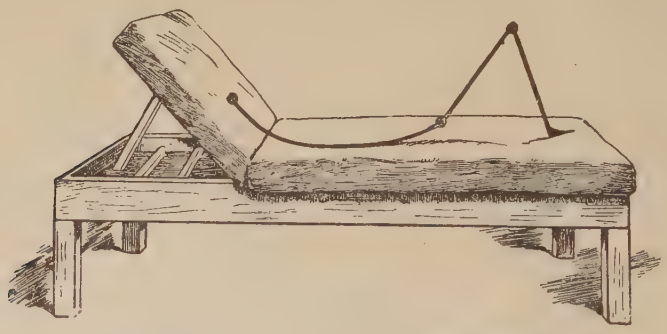

Fig. 1.—Half-Reclining Position (Schematic Representation).

brought nearer to the rim of the thorax. If we wish to enter very deep into the pelvis, or to prevent the patient from making tense the abdominal walls, we direct her to raise the buttocks still higher by active contraction of the glutæi muscles. Deep entrance is also facilitated by raising very slightly that side of the pelvis which is to be treated.

If this position is to be continued for some time during local treatment, the patient would very soon grow tired or would make the abdominal walls tense while attempting to prevent the feet from sliding unless a support were afforded for the feet. Hence I allow the patient's left foot to enter the popliteal space of my left leg in order that my thigh anteriorly offers a support.

The patient's clothes are merely loosened and she is not exposed. The abdomen is covered only with the under vest.

Position of the Physician.

In carrying out local treatment of the pelvis my position is usually as follows. I allow the patient to lie, upon the couch, as close to me as possible (Fig. 2), and sit facing her, upon a chair one to two inches higher than the couch, so that the corner of the couch is between my separated thighs, and the left toes of the patient below my left thigh, as mentioned above. The closer one sits to the patient, the less one needs to bend forward during the treatment. On this account greater and more constant force can be exercised with the

Fig. 2.—Half-Reclining Position for Examination and Massage.

right hand. When we must work many hours in succession, the back muscles would be strained very much if the trunk were bent over forward to a marked degree. I enter with the left hand below the patient's left knee into the vagina or rectum, using only one finger. In this way we can work bimanually and the performance of lifting by another person would not be interfered with. I support my left elbow upon my left thigh, partly in order to support the weight of the trunk and to ease the dorsal muscles, partly in order to hold the index finger more securely in the pelvis and with less fatigue of the arm. During the treatment we always require our full power, because the constant firm pressure on the elastic abdominal walls is very tiring. In order to be able to continue the movements for a considerable period, we must only exert ourselves

to such an extent that respiration still remains easy. It is advantageous to be able to use both hands equally well, in order that they may be changed occasionally.

In order to make the movements of local treatment gently, the joints of the arm and hand must be more or less flexed, and always held easy. The movements themselves, especially the circular movements of the fingers in exploration, massage, etc., are done, as far as possible, by the vigorous shoulder muscles.

In all forms of movements, the gymnast must attempt to secure a good position which not alone makes it possible to perform the movement correctly but also is the least tiresome. It is a general rule, especially in movements of resistance, that any necessary increased movement of his own body should be relegated, as much as possible, to the trunk, with its powerful muscles; the active hands and arms should be held as comfortably as possible, but with sufficient firmness, against the moving trunk; the muscular sense acts much more delicately when the trunk muscles offer the chief resistance. In order to avoid growing tired and in order to gauge accurately the force required during the entire movement, it is sometimes important that we select a good support for the feet.

CHAPTER IV.

EXPLORATION.

After noting the name, age, social condition, previous diseases, the cause of the existing malady, the former treatment, etc., I proceed to the manual exploration. Except under special circumstances, this is always done, not alone through the vagina, but also through the rectum and abdominal walls. Every patient is first examined in the standing, then in the half-reclining posture.

In the standing position the uterus is pressed down lowest and can be most easily reached from all sides, especially in posterior displacements. Other parts of the pelvis may also be reached better than in the recumbent position. It may also be mentioned that the uterus is sometimes normally anteflexed when the patient is standing, while it is displaced backward in the recumbent position.

On examination in the standing position, the physician is seated and places the non-examining arm around the patient in such a way that the hand, placed alongside the sacrum, affords a support. The anointed index finger of the other hand is inserted into the vagina and pushed upward along its posterior wall, while the extended and abducted thumb is directed forward, the three other fingers backward. By means of the exploring finger and the hand held upon the sacrum we can, as a rule, determine not alone the position of the uterus, the shape of the portio vaginalis, etc., but can also feel excoriations, projecting polypi, etc.

The index finger is then introduced through the anus along the anterior wall of the rectum. At the same time the thumb is inserted into the vagina, so that it remains in front of the pars vaginalis, and the index finger passes behind the uterus as high as possible. As a rule, at least the lower two-thirds of the uterus can be carefully examined, and also a large part of the remaining pelvic contents. If the uterus is displaced backward, an attempt is made to restore it to the normal

position, by exerting more or less pressure alternately with the index finger upward and forward upon the corpus and with the thumb downward and backward. In order to discover retractions between the uterus and os pubis, the thumb is passed as high up as possible upon the cervix, and an attempt is made to displace the organ backward and upward. It is only when the uterus lies anteriorly that a marked resistance during such an attempt indicates an anterior fixation.

When there is difficulty in reaching high enough, this will be considerably facilitated if the patient places one foot upon a chair.

Examination in the half-reclining posture is next performed. A seat is taken at the patient's side, one hand is carried below her flexed lower limb, and the index finger inserted in the vagina along its posterior wall. The other hand, upon the abdomen, displaces the intestines by means of constant circular movements, when necessary pushes the movable organs against the internal finger, and thus accurately palpates the pelvis and hypogastrium. The patient is requested to breathe freely and not to make the abdomen tense. We attempt to obtain more accurate data concerning the position, size, consistence, and mobility of the uterus, assure ourselves concerning the parametria, ovaries, etc., and ascertain whether exudations or fixations of any kind can be discovered. The possibility of pregnancy should never be overlooked. The exploration is next conducted in a similar way through the rectum, and the entire posterior wall of the pelvis should then be palpated. In very young patients, in whom a vaginal examination is to be avoided, the necessary information can be obtained, in the majority of cases, by rectal exploration.

The pains which occur so readily in pelvic diseases, even during ordinary movements, warn us to make an extremely careful and gentle examination.

As I received no instruction in gynæcological examination, I began my examinations in a very natural manner and kept my hand "open" during the exploration, *i.e.*, the fingers were not flexed. Patients who had been treated before by physicians expressed to me their satisfaction that I did not annoy them by the pressure of the knuckle of the middle finger. On attempting to examine with the "closed" hand I found that I could not reach as high into the pelvis as in employing my

own method. The text-books recommend examination with two fingers, but as this dilates the vagina so considerably, we cannot reach higher than the length of the middle finger. But if the index finger alone is used, with the "open" hand, we can reach considerably farther, on account of the yielding of the floor of the pelvis. Moreover, one finger can be moved much more freely and can reach all parts of the pelvis without annoying the patient more than is absolutely necessary.

Many women, when examined with two fingers in the vagina, are also said to experience a sexual excitement which is not produced by one finger.

In some a disagreeable feeling is produced on passing the finger into the vagina or rectum. This can be avoided in part by first introducing only the tip of the finger, then stretching the introitus vaginæ a little backward or the anus forward, before the introduction is continued. When the introitus is narrow and tender, the introduction of the finger is effected more readily if the knees are separated and the buttocks somewhat elevated.

When a careful examination is to be made through the abdominal walls, either with one hand or both, it is best to move the palpating fingers in gentle circles, and not to press them directly, however gently, upon the object to be palpated. In the first place we can feel much more delicately, even when the pressure is slight, if the fingers are moving somewhat rapidly. In the second place the intestine is thus pushed away much more readily and with less pain. As a matter of course the circular movements should not be too vigorous nor too rapid, but must be adapted, according to the feel, to each special case.

In order to obtain more accurate data concerning excoriations, mucous polypi, etc., I employ Sims' speculum in the ordinary way. I rarely use a sound, and only when it is necessary to measure the length of the uterine cavity.

Some women have complained that a certain local distress has continued, even for several hours, after a gynæcological examination. As this happens occasionally, even after my own explorations and daily treatment, I attempt to relieve it at once by making a few pressures, with the middle finger, a little behind the anus or upon its posterior circumference. Then follows a brief application of the hand to the abdomen

above the symphysis, the attention of the patient being concentrated upon my hand. This is usually followed by a few slight pressures of the knees with elevation of the sacrum. If general excitement is present it is sometimes necessary to stroke both hands very gently, outside of the clothes, from the epigastrium to the toes, while the patient, with closed eyes, quietly follows this movement.

CHAPTER V.

REDUCTION OF THE UTERUS IN POSTERIOR DISPLACEMENTS.

The reduction of a retroverted uterus depends upon various circumstances, even when adhesions do not offer an obstacle. Sometimes only one hand is used, sometimes both hands are necessary. The fingers may act through the vagina or rectum, or both, with or without the aid of the other hand, which acts through the abdominal walls.

The ordinary positions are the standing and half-reclining positions. The abdominal position is necessary when the uterus is too large and heavy to be replaced in the ordinary positions without much inconvenience or danger.

Before reducing a displaced uterus, we must have a clear idea of all that is necessary for this manipulation; in addition to a delicate feel, a light touch and small movements are requisite. The chief mistake made by beginners is that of making excessively large movements and using excessive force.

When we wish to feel something accurately, Nature teaches us to touch the object lightly and to move to and fro over it with short movements. If we grasp it firmly, our attention is attracted to the movement of the parts, at the expense of the delicacy of feeling. When the movements are very extensive, the movement itself likewise becomes the principal thing and the feel becomes secondary. After we have made ourselves acquainted with the condition of affairs, the movement steps into the foreground. When the position, size, consistence, and flexibility of a freely movable uterus are known, the fingers need merely be placed at or around the uterus (according to the individual circumstances) in order to effect reduction easily and rapidly, at least in the majority of cases, without force or notable pain. The general rule to be followed is:

First determine the mode of execution of the manipulation,

then place the hands in the proper position and effect the change of position by small movements which are hardly noticed by the patient.

If inflammatory conditions or fixations have been found, these must first be removed, at least in part, by massage and stretching before complete reduction may be attempted.

Methods of Reduction.

a. Reduction in standing or abdominal position:
  1. Recto-vaginal reduction—overthrow.

b. Reduction in half-reclining position:
  2. Ventro-vaginal reduction:
    a. Tipping over,
    b. Pinching,
    c. Hooking,
    d. Reduction pressure.
  3. Ventro-rectal reduction.
  4. Ventro-recto-vaginal reduction.

Appendix: Reduction with the supporting finger alone.

Overthrow.—If the uterus is very large, as, for example, in pregnancy, or is sharply flexed posteriorly, the reduction is performed by the exploring hand alone, in the standing or abdominal position. In the former cases it is found not infrequently that a permanent anteflexion is produced.

After the index finger has been carried into the rectum as high as possible, the uterus is gradually pushed, at first upward and forward, then forward and downward, by pressure upon the corpus uteri from behind; at the same time the thumb, inserted into the vagina, pushes the portio vaginalis at first backward, then upward. These alternating pressures must be performed cautiously until the uterus has been anteverted.

If it is found, after reduction, that the uterus has sunk too far or does not lie sufficiently forward, one finger (index finger or thumb) is placed against the anterior surface of the portio vaginalis, the latter is pushed back only to such an extent that the anterior ligaments become a little tense, and so displace the body of the uterus in a curve upward and forward. The uterus is held firmly for a few moments and the fundus will then be found at the symphysis.

For beginners this mode of reduction is the easiest, and, if it is not entirely successful, it may very readily be completed bimanually in the half-reclining position. For this purpose the patient assumes the ordinary abdominal position, while the uterus is held firmly by the fingers in the position already secured; at the end of about ten minutes she cautiously turns into the half-reclining position, whereupon the uterus may be anteverted without difficulty.

Tilting is employed when the uterus is not long and possesses at least so much rigidity and such a position that the fundus can be raised by pressure upon the anterior surface of the cervix. The free hand is thus enabled to pass behind the fundus through the abdominal walls and can push it forward.

Pinching is employed when the uterus is short and rigid, and is applied closely to the sacrum so that it cannot be tilted. The fingers of the free hand are applied through the abdominal walls, immediately above the fundus; and, at the moment when the uterus is pushed upward by pressure upon the isthmus with the exploring finger, the fingers of the free hand are pressed in behind the fundus, so that the body of the uterus is, as it were, squeezed out, and is then carried bimanually, in the ordinary way, forward and downward against the symphysis.

Hooking is employed when the uterus is short and very flexible so that the above-mentioned methods are impracticable. The chief thing is to push the slightly flexed last joint of the index finger as high up as possible behind the corpus, starting from the right or left side of the uterus, in order to lift the fundus forward against the abdominal walls; then the fingers of the free hand, by a slight pressure, are carried above and behind the fundus and can thus complete the reduction.

The employment of "reduction pressure" is most necessary when the portio vaginalis is directed anteriorly and stands somewhat firmly in this position, while the isthmus possesses a certain rigidity; the uterus may not be too long. In such cases I have manipulated in the following way.

In the half-reclining position the index finger of the left hand is carried into the vagina and pushed up below the body of the uterus, which is then raised slightly upon this finger toward the abdominal walls and is carried to the median line,

if necessary, with the aid of the outer hand. The finger tips of the outer hand are now placed upon the abdominal walls and are pushed down to the uppermost part of the cervix. After the supporting finger has now been carried around anteriorly and applied to the anterior surface of the cervix immediately below and opposite the fingers of the external hand, the uterus is pushed up along the sacrum by coincident pressure of the fingers of both hands backward and upward until the anterior ligaments are made somewhat tense, *i.e.*, until they offer a noticeable resistance. As a result of these movements the uterus is already flexed a little anteriorly if no pressure has been made upon the fundus. The supporting finger alone now holds the uterus, without moving from the spot, while the outer hand is carried gently and without pressure along the uterus. When the tips of the fingers are felt to be leaving the fundus, they are at once pushed gently behind the fundus. If, contrary to expectation, reduction has not been effected completely, the free hand is turned around so that the palm of the hand is turned toward the feet; this must be done so carefully that the uterus does not lose its support. Slight pressure forward and downward, or, if necessary, gentle circular rubbings above the fundus and upon any ligament which feels tense, will then complete the reduction. The corpus now lies alongside the supporting finger. This has remained immovable unless it has been necessary, during the massage, to afford a support with the tip of the finger beneath a ligament which may have been tense; at the same time the lateral surface of the finger must be firmly held in position as the support to the cervix.

The body of the uterus is not infrequently pushed forward rapidly by the tense supports, as soon as the free hand has passed the fundus. Perhaps the superjacent intestine pushes the fundus forward upon the exploring finger. When this is felt by the finger, we can at once pass the free hand above the symphysis and grasp the corpus uteri between the hands.

When the portio vaginalis is not as short as is often found in pronounced posterior displacements, both hands may often be applied at once to the anterior surface of the cervix. But before the reduction pressure is made by both hands, the uterus must be carried into the median line, because this is often indispensable to success in all methods of reduction.

Ventro-rectal reduction, which is only necessary in individual cases, for example, in very young girls in order to be able to use massage with better success, is not always easy. The first difficulty in such cases sometimes consists in ascertaining which end of the uterus is the lower one, and whether a posterior displacement is present or not. The supporting finger presses, through the rectum, the corpus forward until the free hand can penetrate behind the fundus and the supporting finger can be applied to the portio vaginalis.

The next method of reduction can sometimes be carried out with the index finger in the rectum, and the free hand, without introducing the thumb into the vagina.

Fig. 3.—Ventro-recto-vaginal Reduction.

Ventro-recto-vaginal reduction is indicated in all cases in which a flexible uterus is very long or the fundus is drawn up so high that it cannot be reached by the exploring finger per vaginam in such a way that it can be lifted toward the abdominal walls, *i.e.*, in cases in which hooking is useless because only the flexible middle passes forward and the flexion is increased. We then purpose, by means of the external hand, to push the corpus downward alongside the finger which has been inserted into the rectum; when this has been done, the reduction is effected mainly by the external hand and the thumb. Although this method requires more time, it is to be recommended to beginners because it is easily performed and is successful in cases of all kinds in which the uterus is movable.

After the patient has assumed the half-reclining position,

and the physician has taken his seat alongside, the index finger of the left hand is inserted into the rectum as high as possible—for this purpose the chair should be pushed nearer to the patient's feet and her knees should be pushed away slightly—so that the tip of the finger passes through the rectal isthmus formed by the third sphincter. The thumb is introduced into the vagina either at the same time or later. Then the palmar surface of the outer hand is placed on the abdomen, with the extended fingers pointing upward. Now the index finger must press from behind upon the body of the uterus above the flexible part, the pressure being exerted alternately more on the left or the right side until the fundus is raised somewhat anteriorly. The external hand then attempts to enter above the fundus at the place where it finds the least resistance, until the tips of the fingers have grasped the fundus to such an extent that they can push the uterus downward along the index finger, and the latter can thus exercise pressure higher up on the corpus. Then the tips of the fingers gradually obtain a hold behind the fundus. In pushing in and grasping the fundus the free fingers should always be moved in gentle shakings or circular frictions, in order to displace as much as possible the loops of intestine which are situated above the uterus.

If the fundus cannot be pushed forward in this way, the thumb which has been inserted in the vagina is applied to the anterior surface of the cervix and the latter is pushed backward. The coincident pressure of the thumb backward and upward and of the fingers of the external hand (behind the fundus) forward and downward causes the uterus to straighten; this is assisted more or less by the index finger of the left hand.

If the reduction cannot be completed in this way, we must look for any adhesion which may interfere with the manipulation. In such an event the tip of the index finger is placed as a support beneath the tense adhesion, while the lateral surfaces of the index finger and the thumb hold the uterus in its half-reduced position, and perform massage upon and around it until the reduction succeeds. If this prove unsuccessful, we must discontinue the manipulation for a while until the obstacle has been removed.

Reduction with One Finger.—If the retroverted uterus is

movable and not too long, it may sometimes be reduced rapidly and painlessly by the index finger alone. This requires skill and practice. With the patient in the half-reclining position the finger is passed into the vagina behind the body of the uterus, and the latter is drawn or lifted gently but firmly toward the abdominal walls, as far as the yielding character of the parts permits. In this position it is held for a few minutes in order to make the stretching of the parts more lasting, and the portio vaginalis is then allowed to glide backward, the lower part of the finger being carried toward the right side. The index finger, which is now curved obliquely around the right side of the uterus, and which still keeps the corpus elevated, is now drawn rapidly but gently in an oblique direction around the uterus, until the tips of the fingers can rapidly exercise pressure backward and upward upon the upper part of the cervix. The finger tip is now placed somewhat lower on the anterior surface of the cervix, and the latter pressed upward, so that the uterus is pushed in a curve upward and forward. At the same time we can distinctly feel the uterus passing into an anteverted position. It is sometimes necessary, however, to complete the reduction with the free hand; this must then be applied to the abdomen high enough to be above the fundus, so that no danger is run of pressing the latter backward. This pressure is felt by the exploring finger, and, guided by it, we pass the free hand cautiously down along the abdominal wall until the posterior surface of the uterus is felt and the completeness of reduction is thus made certain.

Remarks.

I may mention that at the present time, in reducing posterior displacements, I always employ the above-mentioned fine, circular movements of the finger tips, attempting to pass behind the fundus by small displacements from the sides and above alternately. In this way the reduction may be performed almost painlessly.

Beginners often push the uterus too high with the supporting finger and thus diminish the possibility of passing in above the fundus.

In every reduction our information is derived mainly from the feel in the exploring finger, not from that in the free fin-

gers, which are used more for movement. If the ligaments offer excessive resistance to reduction, and if this is to be overcome by light massage, without letting go the portio vaginalis, the exploring finger is allowed to glide obliquely over the anterior surface of the portio vaginalis, so that the tip of the finger comes below the tense ligament and affords support in the ordinary way during massage, while the sides of the finger remain as a support on the anterior surface of the portio vaginalis.

In a patient in whom the uterus had been found movable, I was astonished at the difficulty in reducing the organ in the standing position. I found that this was owing to the fact that the patient held her breath whenever I made an attempt at reduction. After telling her to breathe naturally, reduction was effected, without pain, in a few seconds.

All those who have short fingers should remember that in the treatment of those cases in which their fingers will not suffice in the half-reclining position, they will be more successful when the patient stands, because the uterus, unless fixed by adhesions, will be pushed downward by the abdominal contents. In these cases we can also reach higher through the rectum in the standing than in the half-reclining position.

In hundreds of cases I have observed, in attempts at reduction, that the fundus could be very easily moved to and fro upon the surface of the sacrum, but that it was very difficult to detach it from the sacrum. This is especially true in cases of pronounced flaccidity (atrophy?) of a long uterus in the region of the internal os. This flaccidity may be diminished or abolished by mild massage and lifting movements, but before this is done the uterus will constantly tumble backward on attempting reduction unless the exploring finger is applied directly to this spot or above it.

It often happens to beginners that, on attempting to penetrate above the fundus with the free hand in order to complete reduction, the uterus slips to the right or left. It is then advisable to place the index and little fingers on each side of the fundus, while the middle fingers penetrate. Unsuccessful attempts at reduction sometimes draw the uterus more firmly upward and backward, so that it must again be drawn downward and forward.

In many cases the supporting parts are made most tense,

during reduction, at a certain point, so that the uterus, if it has not passed this point, will again fall backward when released, but will fall forward spontaneously when this point has been passed. It is not easy to decide whether this is due to real tension of the peritoneum and uterine ligaments, or to the action of the internal abdominal pressure which is conveyed, in a certain position, from the anterior to the posterior surface.

Despite the precaution of carefully filing the nail of the index finger, it may happen during difficult reductions that the nail produces slight injuries of the mucous membrane in the portio vaginalis. As a rule these heal rapidly; in only a few cases do ulcerations result, but they must depend on a special predisposition. These also heal after continued treatment.

I may here be permitted to state that I have succeeded in almost all cases in bringing the displaced uterus back to its normal position, with the exception of a small number of cases in which the organ appeared to be very firmly adherent.

CHAPTER VI.

LIFTING MOVEMENTS.

In these movements the pelvic viscera are grasped from above through the abdominal walls and drawn upward, so that their inferior ligaments are stretched. Only the uterus and intestines can be grasped in this way, but the influence of the movements extends over a much larger part of the pelvic viscera.

Only the half-reclining posture may be employed. The patient's clothes are loosened so that the abdomen is covered only by the underclothing. The manipulations are performed after micturition and, if possible, after defecation, at best on an empty stomach or at least two hours after a light breakfast. They are made more vigorously or gently according to the sensibility of the patient, the tension of the abdominal walls, etc., but at the beginning they are always less vigorous. We must avoid causing pain, as far as possible, because the patient then makes the abdomen tense.

Lifting of the Uterus.

This movement consists only of elevation of the uterus, which has been grasped through the abdominal walls; but is performed very differently according to individual circumstances. We will first describe the usual form of manipulation. The first form is employed in prolapse of the uterus and vagina; the second in posterior displacements; the third in considerable enlargement of the uterus. As a rule two persons are required, one of whom sits on the left side, examines during the movement, and conducts it, while the other individual repeats the manipulation three times according to the direction of the former.

Performance of Uterine Lifting.

1. *First Form—Long or High Uterine Lifting.*—The patient, in a half-reclining position upon a long, low couch, draws the legs up strongly, with the knees separated and the feet close together. The physician, sitting at her left side, first brings the uterus into as normal a position as possible, then places the supporting finger high up on the anterior surface of the cervix, and presses it upward and backward, in order that the movable fundus may be carried somewhat farther downward and forward. The free hand is

Fig. 4.—Application of the Assistant's Hand (the Physician has already Removed his Right Hand from the Hypogastrium).

placed flat on the abdominal walls, the fingers directed downward, in order to ascertain the position of the uterus and to carry the intestines upward. The hand pushes the abdominal walls deep into the pelvis, and the assistant is thus shown the locality at which she must apply her hands and enter the pelvis. As soon as this is done, the physician's free hand is removed.

During the lifting and the subsequent letting down of the uterus, the physician attempts not alone to follow and feel the movement with the supporting finger, but also exerts an

influence on the position of the uterus. He attempts, in particular, to aid in retaining the position of anteversion by pressing back the portio vaginalis. It may be mentioned, in passing, that with his left leg he gives the necessary support to the assistant's right leg, which is advanced as far as possible.

The assistant stands opposite the patient, the right leg on the floor on the left side of the patient, and kneeling with the other leg upon the couch, to the outside of the patient's right foot. In order to be able to bend far forward without tumbling, the left knee, as well as the right foot, are placed as far forward as possible, the assistant pushing the patient's knee a little upward and slightly supporting her hip against it, but

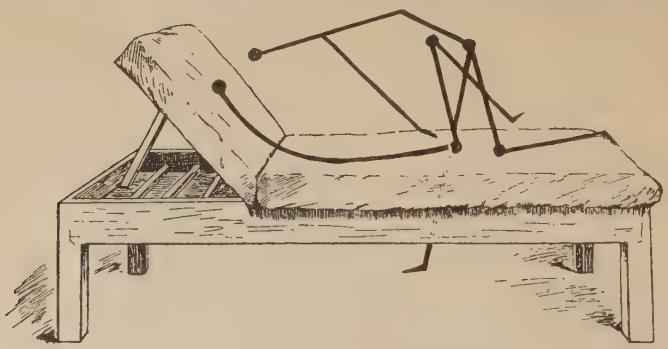

FIG. 5.—PUSHING INTO THE PELVIS (SCHEMATIC).

not to such an extent that the free mobility of the physician's left arm is interfered with.

Hence both individuals must carefully adapt their positions to one another before beginning the manipulation. The patient's feet now swing freely between the assistant's thighs. The latter places the supinated palms of the hands close to one another, with the fingers directed downward, upon the hypogastrium, the fingers being first applied to the spot indicated, close to the physician's hand, and then the palms of the hands when she begins to press into the pelvis. She gradually bends farther forward over the patient, slightly pushing the latter's knee with her hips, at the same time extending the arms and keeping the dorsal surfaces of the hands as near as possible to the symphysis, until the physician feels her fingers pressing against his supporting finger. The power to penetrate into the pelvis is secured, on pushing forward, by the

weight of the trunk, which is bent over forward (Figs. 4 to 6). The straightened fingers of both hands are now bent forward in order to grasp the uterus, as low as possible, between it and the sacrum.

FIG. 6.—PUSHING INTO THE PELVIS.

The uterus is now lifted slowly, with a slight vibratory movement, along the sacrum, at first upward, then forward,

FIG. 7.—PUSHING INTO THE PELVIS (SEEN FROM THE SIDE.)

so far as the ligaments permit. We must endeavor to exercise the pressure, as far as possible, only upon the lower part of the uterus, so that it does not tip over backward but is

brought into the most marked anteversion possible. During this time the assistant again assumes the erect position, gradually flexing the straight arms and supporting them more or less upon her hips. Then she gradually relaxes her grip, while the hands still continue their movements to some extent; the uterus will then slide downward, and, as a rule, this can be felt by the assistant if the manipulation has been properly performed. Before each repetition the physician must examine the position of the uterus, and, if necessary, again reduce it.

FIG. 8.—LIFTING OF THE UTERUS.

If the uterus can be drawn up so far that the supporting finger cannot follow the portio vaginalis, the latter must be supported, on the anterior surface, as quickly as possible after it comes down.

If the abdominal walls have not been pushed down sufficiently, they become too tense when the uterus is drawn up; this may cause pain and interfere with the proper performance of the manipulation.

2. *Second Form—Short or Low Lifting of the Uterus.*—The positions of the patient and the two operators are the same as in the first form. The assistant's hands press into the pelvis in the same way according to the directions of the physician; the vibratory lifting is begun in the same way in an

upward direction (but not forward). As soon as the physician notices that the suspensory parts around the anterior circumference of the cervix uteri are in the same condition of tension as in ordinary reduction-pressure he crys, "Halt!" After this tension has been maintained for a few seconds, he says, "Let go," whereupon the assistant removes her hands vertically, rapidly, but gently. By the aid of the index finger, which is applied to the cervix, the physician will notice at the same time that the corpus uteri falls forward.

3. *Third Form of Lifting of the Uterus.*—When the uterus is very large, lifting may be useful, apart from displacement; for example, in order to make the organ more movable or (as in pregnant women) in order to relieve a painful pressure upon a certain spot.

The positions are the same as before. With the exploring finger of the left hand the physician merely controls the movement, and by slight displacements of the external hand he examines and indicates where the uterus is to be grasped. The assistant (or rather the physician himself) attempts to pass downward from the side, in order to effect a usually inconsiderable lifting in the direction of the pelvic axis. The entire manipulation is done with the greatest caution and with the slightest possible pressure.

4. *Oblique Lifting of the Uterus.*—When there is a lateral displacement of the uterus, lifting is performed by stretching the shortened parts, giving the elongated parts the opportunity to shorten and at the same time by stimulating the latter to contraction by means of vibratory movements. The manipulation may only be carried out when no fixation or inflammatory condition is present.

The positions are the same as in the other forms. The physician restores the uterus to median anteversion, and keeps it in this position until the assistant's hands have penetrated sufficiently. He shoves the abdominal walls down in such a way that they will not become tense before the end of the movement, and gives accurate directions as to the manner in which the assistant applies her hands. During the manipulation he aids, with his index finger, in stretching the shortened ligaments.

Close to the physician's right hand the assistant places the finger of one hand, more or less to the side, and presses down

into the pelvis to enter, like a wedge, between the lateral wall and the uterus. As soon as this hand can press the uterus from the side, the other hand is applied as usual and presses downward, while the physician detaches his right hand and the assistant bends over forward. Now the fingers are bent in order to secure a firmer grip, especially with the lateral hand. The lifting is done not alone upward, but in a direction which is intended to carry the uterus over the median line, while the anterior hand performs a vibratory movement. According as the shortening on one side or the relaxation on the other side predominates, the lifting is either carried as far as possible or, as in the second form, it is interrupted half way, and then the manipulation continued as in that variety.

As a matter of course, all three forms of lifting may be carried out more or less obliquely.

5. *Lifting of the Uterus without Assistance* was done by me during the first few years (until 1868), but since then only at times when no reliable assistant could be obtained or when it appeared unnecessary in the third form.

The physician performs the lifting in the same position and manner as does the assistant. The finger tips of the supinated hands, which are only separated a little from one another, are placed above the symphysis, at the spot where the slightest resistance in the abdominal walls has been found. The intestines are carried upward by a vibratory movement, and the hands, with their posterior surface following the anterior wall of the pelvis, are pressed into the latter, the uterus grasped in the manner described above, lifted, and let go. All three forms may be carried out in this way, the second one with the greatest difficutly. In this manipulation, however, the uterus cannot be felt with sufficient distinctness to avoid, with certainty, pressing the corpus over backward. At all events much greater skill and experience are necessary than when an assistant is employed.

Remarks on Lifting of the Uterus.

The assistant must accurately feel the spot at which the yielding of the abdominal walls will best permit her to penetrate. Fine sensibility and good knowledge of the relations of the parts are always useful, but they are indispensable in the third form and in lifting without assistance. The assist-

ant's legs must be placed so far forward that, during the necessary bending over forward on the extended arms, the body rests securely. Great exercise of force must be avoided; very delicate feeling is never compatible with an exertion of great force.

When the supporting finger of the physician presses back the cervix, the assistant does not need to bend forward to such a marked degree.

If the assistant places her left knee too close to the median line, pressure upon the physician's left hand may result, and he is then prevented from conducting the uterine movement in the proper manner. If the assistant attempts to lift too high, *i.e.*, after the supports around the isthmus are already

Fig. 9.—Position of the Uterus Before and After Lifting.

made tense, she will slide up as far as the body of the uterus, which is then bent over backward by the "semi-tension." The physician will notice this, particularly in the second form, inasmuch as, when the hands of the assistant let go, he does not feel the uterus fall forward in anteversion. In like manner, at the beginning of treatment of a retroflexion, which is very movable from relaxation at the isthmus, the corpus constantly falls back for a time until the flabby part has become firmer through continued liftings and short, gentle massage. It is then necessary to reduce the uterus after each lifting. The lifting of a posteriorly displaced uterus is more apt to injure than to benefit.

Immediately prior to the lifting the external os, which is somewhat elevated by the exploring finger, lies approximately

in the middle between the promontory and the tip of the coccyx (Fig. 9, position 1). By means of lifting in simple retroversion the os uteri cannot be pushed up higher than to the position shown at 2. In marked relaxation in prolapsus uteri the os can be raised higher, but it never goes beyond position 3.

During the manipulation the attention must be directed to the patient's face, so that at every sign of distress the fingers yield like soft springs; in like manner every finger which meets with resistance must yield and slip by the point of resistance.

If the assistant grasps the uterus and draws it in such a way that the lower half is pulled upward and forward, the uterus will fall back. The supporting finger feels this manipulation as a somewhat violent forcing of the portio vaginalis forward, and the lifting must then be interrupted at once. The pains may be due to the violent stretching of the sacro-uterine ligaments by the pressure upon them of the corpus uteri which has been thrown backward and pushed down.

The more the anterior supports are rigid or shortened in posterior displacements, the longer the physician continues the constant tension in the second form. But if true fixation (from cicatricial retraction) is present, this must be relieved prior to each lifting.

In old prolapse, in which there is senile atrophy, we must attempt, in lifting, to penetrate below the intestines, uterus, and broad ligaments in such a way that all these parts are elevated, although the uterus cannot be specially felt at the time. This does not imply that it is immaterial whether a thin and soft atrophic uterus is displaced anteriorly or posteriorly. On the contrary, I believe that the lifting is much more effective when the uterus has first been brought into an anterior position; the broad ligaments then have the normal position, but in posterior displacements they are twisted.

When symptoms of strangury are present, the vagina may not be stretched too much, because traction of the bladder results. Hence the uterus must be grasped more from the side and must first be drawn a little upward, then forward. As a general thing, however, the liftings must be discontinued for a while in such cases.

It is evident that when a sensitive ovary is present, the

pressure must be modified accordingly. If the ovaries are acutely swollen, the lifting movements must be abandoned.

When, after reduction, the uterus is again thrown backward by a lifting, reduction will be found, as a rule, more difficult than before. This seems to be due to an action upon the supports in the opposite direction, inasmuch as the irritation more firmly fastens the uterus, for a time, in the improper position. Hence immediate reduction must be made after the uterus has been accidentally thrown back in this way.

If an inflammation, a recent or old exudation, is present in the peritoneum or pelvic cellular tissue, or the uterus and appendages are fixed in such a way that the fixation might be torn by lifting, this manipulation may not be attempted before the complications have been relieved by massage and stretching. Otherwise an acute exacerbation of the inflammation might develop.

The Effect of Lifting of the Uterus.

Although this manipulation probably exerts a very manifold influence on the different parts of the pelvis, such as the cellular tissue, the uterus, and its ligaments, the vagina, floor of the pelvis, the vessels and nerves passing through the pelvis, etc., its use is especially marked in uterine displacements and prolapse of the vagina.

In view of the great differences among the individual cases of displacement, it is not surprising that the liftings must be performed in different ways, in order that a salutary effect upon the diseased parts may be produced. These modifications are effected, for example, by a different position of the two hands—by applying them more to the front or to the sides of the uterus, by the varying degree of elevation, etc.

In my opinion, lifting exercises a tonic action upon the uterine supports, which may be compared to the tonic action of active movements on the transversely striated muscles. The relaxed parts are stimulated to contraction by a short and vigorous stretching. This stimulating stretching affects not alone the vagina but also the different uterine ligaments and the peritoneum; there must then follow a secondary contraction of all supports, even of the vagina, which holds the uterus inferiorly. The daily repetition of the lifting causes vigorous exercise of the supports.

The relaxation produced at the same time in some of the supports naturally disappears spontaneously in a short time. The previously relaxed but now contracted supports have the opportunity of shortening and gradually acquire the upper hand more and more until the position remains normal. Hence it is a necessary condition of success that the previously shortened parts are sufficiently stretched so that the previously relaxed parts may have an opportunity of becoming shortened by contraction. As a matter of course, the traction may not be so great as to produce a (capillary) hemorrhage. It seems to me to be certain that the main effect of the liftings depends upon the relaxation and contraction of different parts, although I cannot explain this in detail. If the uterine supports could not contract, how could we explain the fact that, in hundreds of cases, the prolapsed or otherwise displaced uterus, when the disorder is due to flaccidity, may be permanently restored to the normal position? In one case, while drawing forward a retroflexed uterus, I distinctly felt a retraction of the posterior ligaments.

During the manipulation the patient has a distinct sensation of drawing upward in the lowermost relaxed parts of the pelvis, so that the external genitalia may even be drawn inward to a certain extent. If there is notable prolapse of the uterus, the organ may sometimes be drawn up, without pain, above the promontory.

In the short form of lifting it is to be supposed that the round ligaments first experience an irritation, and that, when they are rapidly let go, they have an opportunity of shortening. But probably the bladder and some fasciculi of the broad ligaments also take part in the tension which so rapidly throws the fundus forward.

In the sixties I had successful results from liftings without an assistant, but the treatment often lasted five to nine months; at present, the cure is often completed in as many weeks.

In one case the uterus was drawn spasmodically upward to such an extent that only its lower extremity could be reached, and hence this could not be drawn down in the usual way. It was made perfectly movable by an ordinary lifting; hence no true fixation had been present.

I have repeatedly observed that the liftings diminish the

menses as well as abnormal uterine hemorrhages, so that, for example, a very slight menstrual hemorrhage disappears entirely after a lifting. In my opinion, the lifting acts derivatively upon the uterus, inasmuch as it conveys the blood to the ligaments and the pelvic cellular tissue. In cases of hemorrhage, short lifting, without rapid removal of the hands, is carried out.

The liftings exert a distinct curative influence upon ulcerations of the portio vaginalis. This is probably due to the increased absorption which results from the pressure in the pelvis and the clamping of the uterus between the hands or against the sacrum.

Rectal Lifting.

The physician sits on the right side of the patient, who is in the half-reclining position, and places his left hand on her

Fig. 10.—Lifting of the Rectum.

right shoulder and the right hand upon her left hypogastrium, then pushes the fingers with a fine vibratory movement into the pelvis to below the sigmoid flexure. An attempt is now made, by curving the hand, to grasp this flexure of the intestine from below. By carrying the hand along the posterior wall of the pelvo-abdominal cavity in the direction toward the patient's right shoulder, the rectum is now drawn upward. This is repeated three or four times.

Patients whose rectum is not too relaxed feel a retraction

of the anus when this manipulation is properly executed, and this is also visible to the eye.

When the patient has a large abdomen, she first turns somewhat to the right, so that the intestines fall to this side on account of their own weight, and access to the rectal flexure is thus made free. If she turns too far, an increased tension of the abdominal walls results and interferes with the manipulation.

The effect in rectocele and prolapse of the rectum seems to show that a permanent contraction of the rectal wall in the longitudinal direction is gradually produced by the movement.

CHAPTER VII.

MASSAGE.

On Massage in General.

If we attempt to form an opinion, from the statements of the patients themselves, as to the manner in which massage should be performed, we will learn that it is regarded as a torture. This would not be so if masseurs would remember that an equally good result can be produced by first employing light massage of the diseased spot and gradually increasing the force during the course of treatment.

Fig. 11.—Half Reclining Position in Massage.

In massage we should not really rub, but should attempt to press together and to soften any pathological hard spots, etc., by fine and rapid circular movements. This is the main factor when absorption is desired. Constant rubbing, on the other hand, produces traction of the tissues, with great pain. The pain of massage (for example, of the arm muscles) can sometimes be avoided if the palm is applied occasionally to the spot in question and circular movements are performed with constantly increasing force until the tenderness has subsided and a more forcible manipulation can again be employed.

As a rule, massage should be extended to adjacent parts, especially around the diseased spot, where the vessels run toward the heart. In this way absorption is greatly accelerated. It is best to begin with massage of the surrounding parts.

In Sweden masseurs often give their patients great pain, although no evil results are heard of. But I have had under treatment several patients who appear to have acquired a more or less morbid condition of the nervous system on account of such treatment, or whose nervous irritability has been very greatly increased. Hence it is not surprising that I warn operators to be cautious in this respect.

In inflammation of a nerve, the diseased part is usually of slight dimensions, but the symptoms may extend over a large area, perhaps over the entire nervous system. When such a diseased nerve trunk is accessible to the feel, it is found to be thicker, harder, and more sensitive than usual. If massage is applied to it too vigorously, a larger or smaller part of the nervous system may be over-irritated. Whenever pain is present in an inflammation, the finest nerves must be affected in some way, and the same remarks then hold good.

In cases in which general excitation of the nerves has resulted, I allow the patient to rest two or three days before continuing the treatment, with still greater caution.

Hence I make the following rule: Begin every massage gently, passing around the diseased spot and gradually advancing to the latter; increase the force only after the greatest tenderness has subsided; then interrupt by frequent short intervals; toward the end again employ milder massage, later apply the flat of the hand to the diseased spot, and shake it gently. Such a plan, of course, requires more time than the ordinary mode of massage.

Whenever possible I attempt, at least in exudations, to apply massage, by strokings or circular frictions, to the lymph tracts on the centripetal aspect of the diseased part, often as far as the thoracic duct.

When the nervous system, as a whole, is in a morbid condition. it would be much better, in my opinion, to treat by passive and active movements and baths than by the so-called "general body massage" which seems to me to act as an excitant of the nervous system, at least when it is continued for one or two hours.

As we hear that even strong men, accustomed to gymnastic exercises, have been overworked by repeated massage and reductions of the uterus so that this work became impossible to them for several days, I regard it as my duty to describe the means by which I have saved myself from a relapse of this kind. After overwork during the summer of 1875, I had suffered for an entire year from trouble in my right arm, and again during the winter of 1878, despite the use of massage and other forms of treatment. It is my conviction, based upon experience, that, when the muscles are still exercised after Nature calls a halt by the feeling of exhaustion, the punishment will rarely be wanting. Especially when the tired feeling has increased to pain, there must be diminished vitality in the vessels, *i.e.*, an interference with the nutritive and absorptive processes, whose action upon the nerve indicates that we have worked too long. But if, following Nature's hint, we allow the muscle to rest for a while or to be moved, in another way, at best passively, the danger will subside and we may continue. These brief intervals of rest are perhaps as welcome to the patient as they are necessary to the masseur. It is certain that, despite many such slight warnings, I have been able to continue my laborious work without further inconvenience, since I have observed this caution. In like manner I have seen patients who had been confined to bed for several months or even years, but after a week's treatment were able to walk up and down three flights of stairs and take a short walk if the precaution were adopted of walking up each flight of stairs in two or three sections, with definite intervals of rest until they could again breathe quietly and the feeling of exhaustion in the knees had disappeared.

As a general thing, direct massage of the pelvic organs is carried out by me bimanually through the abdominal walls in the half-reclining position. A form which acts indirectly is the "malen" performed with one index finger per rectum. Direct massage is rarely made per rectum, and never per vaginam.

In every massage of the internal pelvic organs much time and labor will be saved if we first use the massage from below upward, on both sides of the promontory; then continue it more deeply in the pelvis from below and the sides, always

following the lymphatics and veins upward in a centripetal direction. It is only after this is done that massage is applied to the diseased part itself.

The general effects of massage are too well known to require mention here. But I must here state that those physicians who, without a personal knowledge of my method, believe that the manual treatment of the uterus with massage, liftings, repeated reductions, etc., always causes an increased flow of blood and hemorrhages from the organ, are entirely mistaken, because experience teaches rather the reverse. It is true that much depends upon how the massage is performed, but there is no doubt that it may diminish and even check excessive hemorrhages.

Bimanual Massage (Circular Rubbings).

The supporting finger, introduced either per vaginam or per rectum, is placed below or behind the part to be masséed, so that it forms a base against which the other hand, operating through the abdominal walls, may moderately depress the part in question. Although the tactus eruditus of the outer hand is not unimportant in skilful massage, it is, in the main, the province of the supporting finger to follow all the movements accurately. In order to be able to work for a protracted period, the elbow must be supported against the operator's thigh.

The root of the finger remains as immovable as possible, but follows, with its tip or a longer portion of its side, the gradual advance of the operating fingers, without taking part in their more rapid movement. The finger tips of the free hand (usually the index and middle fingers or the middle and ring fingers) perform small, rapid circular movements upon the part, but at the same time advance slowly in the proper direction. As a general thing, the course of the vessels is followed centripetally as much as possible. If a movable part of the pelvis, for example, the uterus, ovary, a movable exudation, etc., is treated, we endeavor to raise this, with the supporting finger, somewhat against the abdominal walls, partly in order to spare our own strength, partly in order to induce less pain from pressing the abdominal walls in deeply.

But this does not imply that we should lift as high as possible or that the lower finger should press the part against the upper fingers. Pains in massage (as in exploration, reduction, etc.) develop as frequently from improper manipulation or too vigorous pressure with the supporting finger as they do from the massage itself. We might then make the massage as mild as possible, even inefficient, without avoiding pain. A physician who was under my instruction attempted to apply massage to a large exudation. On being asked whether he manipulated in the same manner as I did, the patient answered: "No; during your treatment I hardly ever feel the inner finger: now it hurts me during the entire manipulation." A small matter, but still worthy of note. The pains often arise when the portio vaginalis is pushed somewhat too far backward and upward, but at once disappear when the pressure subsides.

When the uterus is situated anteriorly, and the ovaries are normal, the support may be furnished per vaginam. In posterior displacements of the uterus or ovaries, the support should be furnished per rectum, in order to apply massage to these parts themselves, to the parametria and abdominal walls, etc. In children I always introduce the supporting finger into the rectum, and this is also done in girls past the age of puberty whenever it is practicable.

During massage we should attempt to keep all parts in as normal a position as possible; hence I attempt to keep the uterus anteverted, even while massage is being applied to other parts. If the uterus remains anteverted only so long as it is held in this position, a special method may be adopted. Ventro-recto-vaginal reduction is performed. Then the thumb is pushed from the anterior surface of the cervix toward its right side and the index finger is passed around its left side, so that both fingers cross (compressing the recto-vaginal septum between them). The tips of these fingers form an angle which is open posteriorly and backward; in this the portio vaginalis is situated and is supported as in a figure-of-8 pessary. If the cervix is pressed backward in this way, the uterus is surely situated anteriorly. In order to apply massage to the parametria, the index finger must be pushed down to the left or the thumb to the right, in order to afford suitable support; at the same time the hand used in massage must

be held in such a way that its middle part acts, from above, as a slight support to the body of the uterus.

Large firm exudations cannot always be pressed against the supporting finger. Then the free hand alone performs the circular frictions upon the surface of the exudation. But we must not fail to control, as far as possible, with the supporting finger, the movements of the free hand.

(*a*) *Massage of the Uterus.*—The anteverted uterus lies upon the supporting finger, while the free fingers make small circular frictions upon the posterior surface of the organ. They advance from above or below toward the region of the internal os, or the circular frictions pass from the internal os upward over the entire body of the uterus and then back. According to the special object in view, the massage is applied either to the body or the cervix or to both.

If a retroverted uterus cannot be reduced, the massage must be carried out in the posterior position; the supporting finger then acts best per rectum, at least in massage of the corpus uteri.

The reduced uterus should never be tipped backward in order to apply massage to the anterior surface, because then the reduction may be difficult, and at all events is annoying to the patient. I employ massage of the anterior surface only when reduction is impossible for the moment or when it is necessary to spare the bladder, apart from the treatment of pathological anteflexions in which the posterior position is intentionally employed during massage. If there is any reason for applying massage to the anterior surface, this should be done, if possible, before reduction, or, if an anterior position is present, the uterus must be tipped back as little as possible, and its anterior position then restored as well as possible. The supporting finger alone produces a not inconsiderable action upon the anterior surface. In addition, it is to be remembered that the majority of the uterine vessels lie more to the sides.

The greatest tenderness in uterine massage is found on both sides around the internal os. In a few cases there is also great tenderness at the middle of the posterior surface of the fundus.

The massage sometimes causes a desire to micturate, especially when the bladder has been subjected to marked irritation. This can be avoided if the uterus is anteverted and

supported per vaginam, when massage is applied to the cervix, and if it is retroverted and supported per rectum, when the corpus is treated more vigorously. In a case of this kind, in which there is an irreducible posterior displacement, the portio vaginalis must be supported from one side while the massage is applied from the other side, in order to avoid the bladder.

When the abdomen is large, the uterus should be carried forward to the side, in order to be able to apply the massage from the inguinal region, where the abdominal walls are most yielding.

(*b*) *Massage of the Appendages.*—As a matter of course, we cannot proceed in a typical manner in cases of large exudation, and must adapt ourselves to the individual circumstances.

As a rule, massage of the broad ligaments is done with circular rubbings, which are carried from the uterus toward the pelvic wall, the support being furnished through the vagina; at the sacro-uterine ligaments and the folds of Douglas the movements are made from before backward and to the sides, and the support is furnished per rectum.

Massage of the tubes is usually effected by circular rubbings toward the uterus; the support, if possible, through the vagina, because the tubes are felt with much greater difficulty through the rectum. As a movable tube is very apt to slide away, it must be repeatedly caught again, as it were, by bimanual palpation from the broad ligament. The massage begins with circular frictions of the corresponding angle of the uterus; then the fingers are applied farther to the outside and the tube followed to the angle of the uterus; and this is continued until gradually the outer extremity of the tube is reached. The outer extremity, especially when it contains a soft, fluctuating swelling, may receive the massage against the supporting finger and the pelvic wall in the direction from within outward and upward.

If the ovary is freely movable, it can be easily brought upon the tip of the finger, and gentle circular rubbings applied; the latter are continued from the ovary in a direction outward and upward upon the posterior abdominal wall. The support is furnished through the vagina or rectum, according to circumstances. As the organ is apt to slip away, it is held in

such a way that an auxiliary support is received from the pelvic wall or the uterus.

(*c*) The pelvic walls, as a matter of course, cannot be grasped bimanually, but the lower finger must be used as much as possible in order to ascertain the conditions during the massage. From above we can only penetrate with the free hand for a short distance (especially at the posterior circumference of the pelvis), in order to make rapid circular rubbings against the pelvic walls in an upward direction. It is then necessary to perform massage, with the supporting finger per rectum, upon the parts which cannot otherwise be reached. It is often done by means of vibratory pressures, during which the tips of the fingers are pushed a little distance over the parts, so that they might be called short, vibratory strokings. The hand is turned in such a way that the palm looks downward, the dorsum upward, but, when necessary, it is turned more or less to one or the other side. The massage with the lower hand must sometimes supplement that with the free hand. For example, an attempt is made to rub both sides of the base of an exudation which extends to the pelvic wall; the mutual pressure then causes slight compression, inasmuch as the finger tips of both hands follow one another. During this time the upper hand performs circular rubbings, the supporting finger small, vibratory strokings. This requires a soft and not too large abdomen.

Stroking (Malen).

This indirect massage is employed particularly in exudations, and always per rectum, either in the standing or half-reclining position. The hand is held in the same way as in the direct massage of the pelvic walls just described. The index finger makes gentle curved strokes toward the iliac vein, from the side of the exudation nearest to the vein. As this stroke involves the large nerve trunks, a painful sensation may be felt by the patient in the hips, thighs, etc., and hence the manipulations must be made very carefully and gently. More or less pain cannot be avoided, especially at the beginning. When we have arrived at that stage in which these strokings can be made without causing too much pain, they may be combined with massage by the free hand, acting

upon the upper prolongations of the lymph channels in the same direction.

The disagreeable sensation experienced by the patient on the introduction of the finger into the rectum will be diminished if the tip of the finger is first inserted, then the anal opening stretched anteriorly toward the vagina, and finally the entire finger inserted.

CHAPTER VIII.

EXECUTION AND EFFECT OF CERTAIN MOVEMENTS.

Every term in our nomenclature is intended to describe the position and the movement to be performed, but changes have developed in "medical" gymnastics so that sometimes the same name is used in different senses.

Hence I have adopted the following rule: First the positions are described, then the manner in which the movement is carried out by me, finally brief mention is made of its mode of action.

Certain movements are regularly combined with one or even two other movements. As a general thing, the one first mentioned is passive, the other is active. The daily schedule (prescription) then mentions only the first movement; the other follows as a "secondary movement" without special mention.

It is impossible to describe the movements in such a way that every tyro can understand their execution from merely reading the description. But I have endeavored to be as explicit as possible, and whenever necessary I have added photographic drawings to the text, so that I may hope, at least, to be understood by professional men. We will now proceed to the description of the individual movements.

Standing—Flexion of the Head.

(Movement of Resistance.)

The patient stands with one foot a short step in front of the other, and the hands upon the hips.

The physician stands in front of the patient, places his hands upon her occiput, supporting his elbows in front of her shoulders. The head is bent somewhat forward against the resistance of the patient, and then is drawn backward by the patient, as far as possible, against the resistance of the physician. This is repeated three or four times.

Bending the Straight Arm.

(Movement of Resistance.)

Position.—*a*, Standing.—The patient stands erect on both feet, with one foot advanced a pace. The arms are extended horizontally on the sides, with the palms directed forward. Later the position of the legs is changed.

b, Sitting.—The patient sits erect with the head elevated and thighs separated, the arms as in *a*. The physician stands

Fig. 12.—Standing, Bending the Straight Arm.

a good pace in front of the patient, his hands applied from above, if necessary from below, behind her wrists.

Movement.—The arms are slowly drawn by the physician, against the resistance of the patient, forward and inward, until they are parallel in the horizontal plane, and then restored to their original position by the patient, against the resistance of the physician. The movement is repeated three or four times, but always ends in the original position.

Remarks.—I attach the chief importance to that half of the movement in which the arms are drawn back and the thorax is elevated.

Action.—This invigorates the muscles which distend the

chest, and makes the respirations easier; it causes a derivation of blood from the head, especially when combined with rotation of the head.

Bent over Forward, Sitting—Double Flexion of the Arm.

(Movement of Resistance.)

Position.—The patient sits upon a chair, with the trunk extended and bent forward, the arms extended upward, and

Fig. 13.—Bent over Forward, Sitting—Flexion of Arm.

the thighs separated. The physician stands in front of her, upon a chair. Each grasps the other's wrists.

Movement.—The patient draws her arms downward, against the resistance of the physician, the elbows being kept as far as possible from the chest. The physician then draws

arms up against the patient's resistance. This is repeated three or four times.

Action.—This is a powerful derivative from the pelvis and also from the head toward the back.

Erect, Sitting—Double Rotation of the Arms.

(Passive Movement.)

Position.—The patient sits erect, for example, upon a chair, with the back and, if possible, the head supported against the physician's leg. Her arms are raised. The physician stands behind her, upon another chair, as in elevation of the thorax.

The corresponding hand of the patient and physician grasp one another in such a way that each encircles the wrist or rather the lower end of the other's forearm.

Movement.—The physician carries the patient's arms quite rapidly around in a circle, the forearms being kept nearly vertical; at a certain point in the circle the arms are extended straight upward or a little to the side. The circle is made about eight to twelve times.

Fig. 14.—Erect, Sitting—Double Rotation of Arms.

Remarks.—I make this movement somewhat interruptedly and only in one direction. The arms should not be carried below the horizontal plane, and in the anterior part of the circle they must pass upward, in the posterior part downward. Afterward I always make two or three double flexions of the arm. The arms, extended straight upward, are drawn down by the patient, against the physician's resistance; during this movement the elbows should be held to the outside as much as possible. Then the arms are drawn up by the physician, against the resistance of the patient.

Action.—The movement is employed as a derivative from the pelvis, especially in feeble individuals.

Percussion of Arm and Leg.

(Passive Movement.)

Position.—A special position for these movements is not necessary, except that it must be convenient for both physician and patient. For example, the patient, sitting, may support the arm by means of the hand placed on the arm of the chair, or, in standing, may place the leg which is to be manipulated upon a chair. The clothes must be drawn well up over the leg.

Movement.—1. The physician slaps the palms of the hands around the patient's arm or leg, passing from above downward. This is repeated for a few times in different lines upon each limb.

2. The physician grasps, between the palms of his hands, the arm or leg of the patient and beats the soft parts, drawing the hands to and fro under a certain pressure. The hands gradually pass from above downward along the limb, and this is repeated several times.

Action.—This movement is employed when the arms or legs are cold on account of diminished activity of the vessels and nerves.

Kneading of the Arms and Legs.

(Passive Movement.)

Position.—The same remarks hold good as in regard to the previous movement. The half-reclining position is best in kneading the leg.

Movement.—The limb is grasped by the fingers of both hands, and the soft parts are kneaded by means of small circular movements, especially with the thumbs. This is done most vigorously in an upward direction, but, at the same time, we gradually pass from above over the entire limb. This is repeated a few times.

Action.—This is the same as that of the previous manipulation. Sometimes it is only necessary to knead the legs, as the thighs remain warm.

Standing—Lifting of the Arm with Deep Respiration.

(Spontaneous Movement.)

The patient stands with raised head; the straight arms are carried from below forward and upward, and toward the end of this movement a deep inspiration is taken; then the arms are carried to the side and downward, during a deep expiration.

Sitting, Relaxed—Lifting of the Chest.

(Passive Movement.)

Position.—The patient sits upon a chair with the arms hanging and the head thrown back. The physician stands

Fig. 15.—Sitting Relaxed—Lifting of the Chest.

behind her upon another chair, one foot turned inward and close to the patient's buttocks, and the knees supporting her back; he grasps her from the front around the axillæ.

Movement.—While the patient takes a deep inspiration, the physician draws the shoulders and arms vigorously upward, so that the chest is also raised; then the shoulders are drawn back, while the knee presses the chest forward with a slight pressure; finally, the shoulders are allowed to return to their former position, during expiration. This is repeated four or five times.

Standing—Tension of the Chest.

(Passive Movement.)

Position.—The patient stands with raised arms, holding firmly, for example, to two door-posts, the arms horizontal and turned to the sides, the forearms directed upward; the feet are placed immediately in front of, behind, or upon the threshold, according to circumstances.

Fig. 16.—Standing—Tension of the Chest.

The physician stands behind her and places one hand, with the fingers turned upward, upon the lower half of the dorsal spine, the other upon the abdomen.

Movement.—During deep inspiration, and while the patient stands on her toes, she is pushed forward in the thoracic region by the physician, so that the chest is thrown out. The other hand attempts to prevent too great protrusion of the abdomen. During expiration the pressure is discontinued and the previous position resumed.

Supported, Standing—Alternate Lateral Flexion.

(Resistance and Spontaneous Movement.)

Position.—The patient stands with the legs separated, the arms extended upward, the palms of the hands turned toward one another. The small of the back is supported against some object. The physician stands in front of the patient, lightly grasping her elbows from the outside.

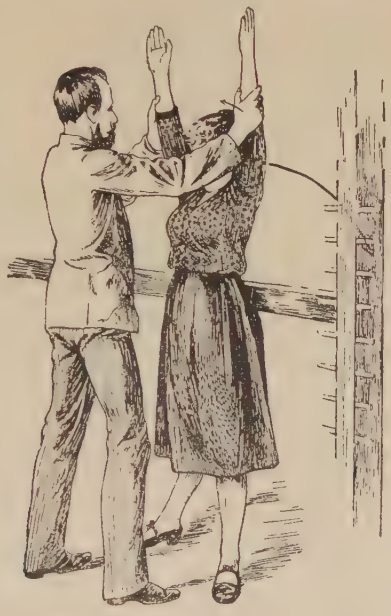

Fig. 17.—Supported Standing—Alternate Lateral Flexion.

Movement of Resistance.—The physician bends the patient's trunk to the side, against her resistance, and then offers resistance when she raises the trunk. This is done three or four times, alternately on the right and left side.

This is also done as a spontaneous movement, without resistance, in the same way.

Remarks.—Patients with pelvic diseases cannot tolerate this movement when performed as above directed; the trunk should then be rotated a little to the side toward which the flexion is to be made, so that the pressure exercised by the physician upon the elbows does not act solely from the side,

but also from behind forward. The patient's head must follow the trunk, and she must stand firmly on both feet.

Action.—It determines blood away from the head, and also, to some extent, from the pelvis.

Supported, Standing—Alternate Rotation.

(Movement of Resistance.)

Position as in the previous manipulation, but the physician preferably stands behind the patient at a certain height, grasping her hands. Usually I direct the patient to stand at the end of a high couch. She is then supported a little below the small of the back. The physician then stands on the couch, behind the patient, with his knee supporting her back, and grasps her hands.

Movement.—The patient is turned to one side, against her resistance; then she turns herself forward, against the physician's resistance. This is done three or four times, alternately toward each side.

Action.—This is derivative from the interior of the chest to the outer parts; it also determines blood to the pelvis.

Rotated, Sitting—Anterior Rotation, with Dorsal Pressure.

(Movement of Resistance.)

Position.—The patient sits upon a chair, with the arms extended either straight upward or a little to the side, the trunk and arms turned as much as possible to one side, the thighs separated.

The physician stands behind her upon a chair, one leg, with the foot turned in, close to the patient, so that the outside of his knee offers a support to the side of the spine upon the side which is turned forward. The physician and patient grasp each other's wrists. By drawing the patient's arms upward the physician attempts to exercise a regulating influence on the entire movement, especially on that of the thorax.

Movement.—The patient turns herself slowly forward, contracting chiefly the muscles of the chest and abdomen, very little the muscles of the arm which is turned backward, and not at all those of the arm which is turned forward; the

physician's knee is used as a point of leverage; the physician offers suitable resistance, with the arm which is turned back, to the patient's movement. He then restores the patient to her original position, against her resistance. This is repeated three or four times on each side.

FIG. 18.—ROTATED SITTING—ANTERIOR ROTATION.

Remarks.—It is especially in cases of excessive hemorrhage that we must avoid drawing the patient over backward from the erect position.

Action.—In uterine hemorrhages it is quite a strong derivative from the pelvis.

ALTERNATE ROTATION.

(Movement of Resistance.)

Position.—a, Riding Position.—The patient sits in a riding position upon a couch, if necessary on a chair, the legs supported firmly in any way, the hands upon the hips. The

head is inclined backward. The physician stands behind the patient, supporting her with his chest, and grasps her from below with both hands immediately in front of her axillæ.

Movement.—By drawing back one shoulder the trunk is turned to one side, against the patient's resistance; then turned forward, against the resistance of the physician. This is repeated three or four times alternately on each side.

Fig. 19.—Riding Position—Alternate Rotation.

Remarks.—As a rule this movement is followed by drawing the patient, who bends slightly forward, backward, against her resistance.

Action.—Strengthens the abdominal walls, for example, in constipation.

b, Riding Position, with Trunk Bent Forward.—Is performed in approximately the same way. The patient sits bent over forward, so that the back is curved during the entire movement. The physician must bend somewhat forward in order to afford support with his chest. During the lateral rotation the trunk is drawn backward, but only as far as the vertical direction. This is also followed a few times by drawing backward.

Action.—Is employed in diarrhœa or floating kidney.

Kneeling, Bent Back—Screw Rotation.

(Passive Movement.)

Position.—The patient kneels upon a mat or pillow, with thighs separated, the hands upon the hips, the trunk and head bent over backward, so that the pelvis projects prominently. The physician stands behind the patient and places one foot

Fig. 20.—Kneeling, Bent Back—Screw Rotation.

so far forward between her knees that his ankle is about on the line connecting her knees; his knee then exercises a supporting pressure upon her sacrum; from behind and below his hands grasp her shoulders in front of the axillæ.

Movement.—The patient is first pushed over so far forward that the entire trunk, which is curved backward in the shape of a bow, lies in front of a vertical plane passing through the two knees; the thighs form the largest possible angle with the legs, and, in order to avoid falling over forward, the patient must be held by the physician. Then the trunk, especially the upper part, is turned eight to twelve times alternately, in five to six seconds, toward both sides by means of forward and backward movements of the physician's hands,

while his knee keeps the pelvis pressed forward. Then the patient is drawn backward. This is repeated three times.

Action.—This is one of the most powerful determining movements to the pelvis.

Kneeling—Falling Backward.

(Spontaneous Movement.)

The patient kneels, with separated thighs, upon a pillow, with projecting pelvis; she allows the body, chiefly the head,

Fig. 21.—Kneeling—Falling Backward.

to fall slowly backward, and then assumes the erect position. This is repeated a few times.

A determining action to the pelvis.

Lying, Bent Forward—Supporting the Trunk.

(Active Movement.)

Position.—The patient lies, face downward, on a high couch, but only upon the legs, which are securely held from above, while the trunk, which is bent upward and backward, projects; the hands are placed on the hips, the head is held back. The patient must remain a short time in this position.

Assumption and Termination of the Position.—The patient first assumes a kneeling position on the couch; the necessary fixation is effected by an assistant, who carefully sits

upon the patient's legs. The physician stands in front of the patient, grasps her with the hands under the axillæ (or as in Fig. 23), carries her rapidly into the initial position (Fig. 22), and lets go at once, so that neither during the movement nor afterward does she receive much support from him. This avoids the tension of the abdominal muscles, with projecting pelvis, which would develop if the patient were let down slowly. Then the physician places his hands in the region of the false ribs and lifts her rapidly, but without violence, into the kneeling position.

FIG. 22.—LYING ON THE ABDOMEN—SUPPORTING THE TRUNK, *a*.

Remarks.—Instead of "supporting the trunk," I direct the patient to make the following movement: She bends the trunk at the hip joints toward the floor, turns the head, during deep expiration, toward the sides, and then brings the trunk back to the erect position. The entire manipulation is repeated twice. The abdomen must not be in contact with the couch, as the pressure against the symphysis would cause pain.

Action.—This movement is not harmful *per se* to young and vigorous patients who are suffering from pelvic disorders. It increases the nervous activity and circulation of blood in the entire dorsal surface of the trunk and the posterior parts

of the thighs, and hence may not be employed in obstinate constipation. It is a vigorous derivative from the pelvis, as well as from the head. It also appears to invigorate those

Fig. 23.—Lying on the Abdomen—Supporting the Trunk, *b*.

uterine supports which hold the organ forward, and is therefore used in posterior displacements.

Sitting Bent, with Fixed Hips—Alternate Rotation.

(Movement of Resistance.)

Position.—The patient sits, with knees together, upon a chair, bent somewhat forward, the hands upon the hips, the feet sufficiently forward to afford the necessary support (as in Fig. 24).

The physician sits in front of the patient, her knees between his; in rotation to the right, his left hand is placed in the right axilla, with the thumb open as a support; his right hand is placed, from above, behind the patient's left shoulder. In rotation to the left the hands are changed.

Movement.—Against the patient's resistance, and without pushing her to one side, she is turned to the right by pushing

forward her left shoulder; she then turns forward, against the resistance of the physician, by drawing back her left shoulder. This is done three or four times alternately toward each side.

Remarks.—I always direct the patient to erect the trunk a few times as a secondary movement. The gymnast places both hands upon the patient's shoulders and draws the trunk forward, against her resistance, and then offers resistance while she is drawing the trunk back to the erect position or a little beyond (Fig. 24). I also consider it very important that the spine is not bent over backward, but that it is kept some-

FIG. 24.—SITTING BENT—ERECTING THE TRUNK.

what convex posteriorly during the entire movement. In uterine displacements I prefer this position to those in which the knees are separated, because in the latter a certain downward pressure is felt in the pelvis.

Action.—Increases the vascular and nervous activity, especially in the region of the loins, and is a derivative from the pelvis.

SITTING BENT, WITH RAISED ARMS—ALTERNATE ROTATION.

(Movement of Resistance.)

Position.—*a*, Sitting Bent, with Extended Arms; *b*, Sitting Bent, with Raised Arms.—The patient sits with the trunk bent forward and the thighs separated (Fig. 25): in *a* with the arms extended upward; in *b*, the arms are raised to the hori-

zontal and the forearms are held approximately parallel with the trunk.

The physician stands upon a chair in front of the patient and grasps her hands, so that her forearms are situated between the index and middle fingers; the patient's strongly pronated hands encircle the physician's forearms.

Movement.—Without the slightest displacement to the side, the patient is rotated against slight resistance, one of the

Fig. 25.—Sitting Bent with Raised Arms—Alternate Rotation.

physician's hands affording a steady support, while the other draws the corresponding side of the patient forward. Then the patient slowly rotates backward by drawing back the side which has been advanced, the corresponding hand of the physician offering resistance, while the other furnishes steady support. This is repeated three or four times on each side alternately.

Remarks.—At first position *a* was used, but gradually the arms were flexed more and more in order to gain more power in the movement, and position *b* has long been in vogue (Fig. 25). I always add a few erections of the trunk, during which

the arms may be more extended but the trunk must remain somewhat curved backward. The trunk is drawn forward, by means of the uplifted arms, against the patient's resistance, and then drawn back into the erect position, against the physician's resistance.

Action.—Increases the vascular and nervous activity in the entire dorsal surface of the trunk, and is a vigorous derivative from the pelvis.

Second Mode of Performance.—Position of the patient approximately the same as before. The physician stands between the patient's knees and places the palms of his hands behind her shoulders, so that his arms, lying in the axillæ, afford a support, and the patient's hands are placed on the gymnast's shoulders.

The movement corresponds to the previous description.

Fig. 26.—Sitting in the Riding Position—Rolling the Trunk.

Sitting in the Riding Position—Rolling the Trunk.

(Passive Movement.)

Position.—The patient sits in a riding position upon a chair or couch, which may not be very broad, the hands upon the hips, the thighs fixed, the chest projecting, the head high.

Two persons (physician and gymnast) stand behind the patient, alongside one another, and each one applies a hand to her shoulder.

Movement.—While the patient keeps herself somewhat erect but otherwise remains passive, the two operators draw her trunk in a circle, first to the right, then to the left, but without twisting the trunk.

Remarks.—The movement should be made as much as possible in the lumbar region, not in the hip joints, and should be entirely uniform. In inflammatory pelvic conditions the circle is only made in front of the vertical position; in this event we do not add, as is usually done, a few alternate rotations and backward tractions of the trunk. Care must also be taken, at least in some women, that the pelvis is not drawn so far forward as to cause a sexual irritation in the vulva.

Action.—It accelerates the circulation in the portal vein and has a stimulant action on the bowels.

Standing, with the Hips Fixed—Rolling the Trunk.

(Spontaneous Movement.)

The patient stands with separated legs, the hands upon the hips; the trunk is moved in a circle, first toward one side, then toward the other. The legs must be kept extended.

Action.—This is somewhat determining to the pelvis.

Standing Tense—Abdominal Stroking.

Position.—The patient stands with the posterior surface of the body leaning against a flat surface, such as a wall, with the raised arms holding on to a high object in such a way that the entire body is thus kept in somewhat tense extension. It is sometimes more convenient for the physician when the patient stands on a stool. The clothes are loosened, and only the underclothing covers the abdomen. The physician stands in front of the patient.

Movement.—This consists of two parts:

1. The physician's hands are held symmetrically the entire time, the carpi and ball of the thumb making, under a certain pressure, five to seven rapid strokes from the median line downward and outward, approximately parallel to the edge

of the ribs and gradually becoming lower. This is repeated three or four times.

At first the hands are placed flat on the epigastrium and hypochondria in such a way that the fingers are turned out and very little upward. While the finger tips remain almost perfectly quiet and only advance gradually downward with

FIG. 27.—STANDING TENSE—ABDOMINAL STROKING. THE ABDOMEN SHOULD BE COVERED BY THE SHIRT ALONE.

each stroke, the carpi rapidly describe obliquely oval rings in a direction outward and downward, the thumb remaining abducted. The other fingers are gradually flexed, while the stroking part of the ring is described, and then are again extended.

2. Both hands work at the same time, one on each side, but in different ways; together they are intended to stroke

the large intestine from the right to the left iliac fossa, the carpi and ball of the thumb exercising the greatest pressure. The left hand manipulates on the right side, at first from below upward, then transversely upon the abdomen along the cæcum, ascending and transverse colon; the right hand manipulates the transverse and descending colon, the position of the hands upon the transverse colon being changed in such a way that the right hand is applied in the median line to the right of the left hand, which is still stroking toward the left, and thus to a certain extent continues the stroking of the left hand which now lets go. Then the left hand again begins immediately in the right iliac fossa. This movement is performed four or five times, not very slowly but by no means as rapidly as the first part of the manipulation.

The hands are carried along two lines which pass into another at a sharp angle below the hypochondrium, but the stroking is not interrupted at this angle. At first the left hand is situated more obliquely, the fingers turned backward, outward, and a little upward, the carpus pressing upon the right iliac fossa and then stroking upward, while the tips of the fingers remain quiet; then the entire length of the hand is moved transversely to the left, the main pressure being exerted first by the carpus, then by the palm of the hand, and finally by the fingers. The right hand lies, at first, with the carpus about in the median line below the epigastrium, the fingers directed outward and upward; the wrist then strokes transversely outward while the fingers remain *in situ;* then the movement is made downward to the left iliac fossa, the pressure being exerted at first by the wrist, later by the fingers.

Remarks.—The pressure must be sufficiently vigorous, especially in the second part, to act upon the deeper parts and not alone upon the abdominal walls, but it must be done with gentle hands, so that pains are not produced on contact with accumulations of fæces or gas, and still less, with a movable kidney, should this be present. The effective parts of the movements of the hand may never extend to the thorax or the pelvic bones. The movements may not be made in fits and starts, but must always be uniformly stroking.

Action.—The blood is determined to the intestines, and peristalsis is stimulated. The first part of the movement is in-

tended to act more upon the small intestine, the second part upon the large intestine. Hence it is effective in constipation, but is to be avoided in excessive uterine hemorrhages.

Half Reclining—Abdominal Kneading.

(Passive Movement.)

Position.—The ordinary low, half-reclining position. The abdomen is covered only by the underclothing.

Movement.—This consists of two successive parts—

1. The physician, who is seated to one side, begins in the left iliac fossa and attempts, by small displacing movements with the finger tips of both hands, to carry the intestinal contents downward without displacing them in relation to the abdominal walls. When scybala are felt, we must sometimes delay a little longer, until they can be displaced decidedly. We pass slowly up along the colon, then transversely to the right, then downward, until finally the cæcum is manipulated in the same way. Then the same movements are continued in the opposite direction, until they finally end in the left iliac fossa.

2. The physician, sitting to the left side of the patient, places both hands over one another transversely upon the patient's abdomen. Then, for quite a while, he performs a sort of kneading, inasmuch as the hands, which follow one another closely, are turned quite slowly and with uninterrupted pressure in a sort of circle. The upper hand always follows the lower one; but, in order to describe the manipulation more easily, we will here speak only of the lower hand. At first the physician presses the fingers (which are kept closed and are bent very little or not at all) into the more remote iliac fossa, while, at the same time, he draws the latter vigorously toward him, so that the contents of the abdominal cavity are carried as much as possible toward the other side by the pressure of the fingers. Then the hands are gradually turned until the dorsal surfaces are directed a little upward, and the pressure upon the abdomen is exerted chiefly by the middle portion of the hand. The turning continues uninterruptedly, so that the pressure is exerted more and more by the wrist. This enters the nearest iliac fossa and pushes quite strongly to the median side, so that the entire abdominal contents, especially of the iliac fossa, are pushed as far as possible toward the other side.

Now the hand turns, with the dorsal surface somewhat downward, and attempts to grasp the contents of the abdominal cavity quite deeply from below, and to press them upward. Then the hand gradually turns into the original position until the circle again begins and is repeated in the same way.

Remarks.—As a matter of course the movements must be performed at a sufficient depth to reach the desired parts. But as the intestines are very tender, especially when they contain scybala or gas, we must proceed very cautiously and expect the desired results from the exercise of patience rather than of great force. In uterine displacements and pelvic inflammations the second part of the manipulation must be carried out with the greatest caution, so that, for example, the reduced uterus is not pushed backward. This is not so apt to occur in the lower part of the circle as it is in the upper part, when the pressure is directed too far downward. In many cases we must also be careful to avoid irritating the bladder.

Action.—This acts vigorously in constipation, especially when followed by transverse shaking of the loins. It is to be avoided in excessive hemorrhages.

Sitting Relaxed—Transverse Shaking of the Loins.

(Passive Movement.)

Position.—The patient sits on a chair, the trunk slightly bent over forward, somewhat loosely, so that the abdominal walls are entirely relaxed.

The physician sits in front of the patient and grasps her loins between the thorax and the crest of the ilium, the wrists being turned more to the median line, so that they may act more from the front.

Movement.—The physician shakes the abdomen ten to twelve times by carrying the hands alternately to and fro. The movement is repeated three or four times at short intervals.

Action.—This movement acts upon the intestines and facilitates defecation, although not very powerfully. It is used in colic pains. It is especially useful in increased uterine hemorrhage because many other manipulations which favor increased movements from the bowels must then be avoided.

Half Reclining.

(Passive Movement.)

Position.—The ordinary low, half-reclining position. During the first movement the physician sits or stands at the patient's side; during the second he is always at her left side.

Movement.—1, Epigastric Kneading.—With the finger tips of both hands the physician attempts to penetrate the epigastrium as deeply as he can without producing pain, and manipulates for a short time the viscera in that region. The different fingers act separately.

2. Shaking of the Stomach.—Then the physician places both hands alongside one another upon the left hypochondrium. The finger tips are applied in a curved line upon the abdominal walls a few inches below and parallel to the border of the ribs, are pressed in and, as the fingers are gradually bent, they are carried obliquely upward and as deeply as possible into the left hypochondrium. Here a gentle shaking movement is performed, and is repeated a few times at short intervals.

Action.—The first movement is intended to influence a part of the stomach and the vessels situated in the epigastrium; the second influences the stomach.

It is employed in anorexia, eructations, and other symptoms of gastric catarrh.

Half Reclining—Transverse Shaking of the Abdomen.

(Passive Movement.)

Position.—The ordinary low, half-reclining position. The physician sits at the side of the patient and places both hands transversely across one another upon her abdomen.

Movement.—Shaking of the viscera is effected by drawing the hands to and fro in a transverse direction. At first the pressure is extremely slight and the movement as extensive as possible, but with every transverse movement of the hands the pressure gradually increases and the extent of the movement diminishes until the hands merely exert, for a few minutes, a vibratory, tolerably strong pressure deep against the spinal column. Then the pressure gradually subsides, the hands are raised, and the vibration passes into transverse

shaking, which becomes more and more extensive until, with the slightest possible pressure, the hands again perform the most extensive transverse movement. Now follows a brief intermission. Then the movement is repeated a few times in the same way.

Remarks.—Prior to the manipulation proper, I perform a special introductory movement, which resembles that made by a cat when she grasps an object with projecting claws and draws it toward her. The physician stands at the side of the patient, his face turned toward her feet. The position of the hands and fingers corresponds to that of piano-playing. The left hand manipulates on the left side, the right hand on the right side, in a symmetrical manner, but alternating in time. At first the tips of the fingers are applied to the uppermost part of the abdomen; the tip of the index finger first presses in, then the hand is turned and the other finger tips enter, while the index finger lets go. During this manipulation the fingers draw upward, as if they intended drawing the viscera upward. While one hand is performing this manipulation, the other crawls downward a little, so that gradually the entire abdomen is manipulated in this way.

Action.—This movement is employed in diarrhœa, sometimes to great advantage.

Half Reclining—Rotation of the Thigh.

(Passive Movement.)

Position.—The patient sits leaning far back, the knee which is not to be moved being fixed in some way (as in Fig. 29). The physician stands to one side, grasps the leg with one hand below the popliteal space, with the other hand grasps the foot, and lifts the limb so that it is flexed at the knee and hip.

Movement.—The knee is moved in a circle eight to ten times from within outward; it should not be carried nearer to the median line than a vertical plane drawn through the hip and ankle while in the initial position. Pressure against the abdomen is exercised during each rotation. Then this is repeated with the other leg.

Remarks.—I always keep the legs somewhat separated. Unless this is done and the knee is carried inward or even beyond the median line, sexual irritation of the vulva may de-

velop in some women. I do not perform the movement uniformly, but always with a rapid jerk upward and outward in the corresponding part of the circle. In all cases it is followed at once by depression of the knee, and in cases of constipation also by an upward swing of the knee. It is a mistake to allow the pressure to reach the thorax instead of the abdomen, and hence the knee must be strongly flexed during the movement, *i.e.*, the foot must be pressed close to the thigh.

Action.—Acts favorably in constipation, increases menstruation and the like, but may not be employed in inflammatory diseases of the pelvis.

Standing, Bent Backward—Rotation of the Thigh.

(Passive Movement.)

Position.—The patient stands, for example, one pace in front of an open door, with her back to the door. The extended arms and the trunk are bent over backward, the hands grasp the door-posts as firmly as possible; one knee is drawn up high.

Two persons (physician and assistant) stand on either side of the patient, and each places one hand over the other upon the small of the patient's back, while with the other he grasps the raised knee from in front.

Movement.—The manipulators carry the patient's knee eight to ten times in a circle, but never beyond the median line, while they afford the necessary support with the hand upon her back. Then the same movement is performed with the other knee.

Remarks.—I always allow two secondary movements to follow—

1. While in the above position, the knee is carried to the outside by the patient, against the resistance of the manipulators, and then carried back to the median plane by the latter, against the resistance of the patient. This is repeated three or four times on each side.

2. The manipulators place their hands above the knee and push it down, against the patient's resistance, until the sole of the foot touches the floor, whereupon the patient again draws up the knee, against the manipulators' resistance. This is repeated two or three times on each side.

Action.—This movement determines very strongly to the pelvis.

FIG. 28.—STANDING BENT BACKWARD—ROTATION OF THE THIGH. (The physician standing on the right side is not drawn.)

STANDING ON ONE FOOT—ROTATION OF THE THIGH.

(Spontaneous Movement.)

Position.—The patient stands, with the aid of some support, on one leg; the other is drawn up and the knee flexed. The latter is carried around in a circle a few times; then the movement is repeated with the other leg.

Action.—This determines to the pelvis.

HALF RECLINING—SWINGING THE KNEE UPWARD.

(Passive Movement.)

Position.—The same as in the succeeding manipulation.

Movement.—The thigh is pushed in jerks against the abdomen (not the chest) six to eight times with considerable rapidity.

Remarks.—I keep the limbs somewhat separated so that the blows reach the lower part of the abdomen a little obliquely from the outside. As a rule, it is followed at once by depression of the knee; it is sometimes preceded by rotation of the thigh.

Action.—It facilitates defecation but also increases menstruation.

Half Reclining—Pushing the Knee Down.

(Movement of Resistance.)

Position.—The patient sits, leaning far back. One knee is flexed and drawn up high; the other is fixed in some way.

Fig. 29.—Half Reclining—Pushing the Knee Down.

The physician stands to one side and a little in front of the patient, one hand upon her knee, the other under her foot.

Movement.—The leg is slowly pushed down and extended, against the patient's resistance, until it is straight and horizontal; then it is restored by the patient to the initial position, against the physician's resistance. This is repeated three or four times.

Remarks.—In amenorrhœa this always follows rotation of

the thigh, and also in constipation. During the movement the patient keeps the legs separated.

Action.—This movement is never employed by me in pelvic diseases unless menstruation is scanty, because it increases uterine hemorrhage.

Standing Bent Backward, Supported on One Foot—Flexion of the Knee.

(Movement of Resistance.)

Position.—One foot is extended and its dorsal surface rests upon a stool or chair, so that the flexed knee does not project

Fig. 30.—Standing Bent Backward, Supported on One Foot—Flexion of the Knee.

forward beyond the other leg, on which the patient stands. The arms are extended upward, in a parallel direction, with the palms turned a little forward and the thumbs abducted.

The head and spine, together with the extended arms, are bent over backward.

The physician stands upon the chair behind the patient and grasps her hands in the manner shown in Fig. 30.

Movement.—The patient rises upon her toes and then slowly bends the knee, during slight pressure on the part of the physician and while the position of the trunk is retained; with the assistance of the physician, the leg is then extended, and finally the patient brings the sole of the foot to the floor. This is repeated three to four times with each limb, the physician merely attempting, as it were, to pilot the movement.

Remarks.—In order that the desired effect upon the pelvic organs should be obtained, the pelvis must be held projecting during the entire manipulation.

Action.—It determines the blood actively to the pelvis and lower limbs, and is used in amenorrhœa and dysmenorrhœa; otherwise it should not be employed.

Standing, Supported on One Foot—Flexion of the Knee.

(Spontaneous Movement.)

Position.—The arms are slightly advanced, so that the hands can grasp an object as a support at a convenient height; one knee is bent (but not held in front of the other leg) so that the extended foot is supported behind upon a stool or chair.

Movement.—The patient raises herself on her toes, slowly flexes the knee of the leg upon which she is standing, so that the trunk sinks; she then slowly extends the knee and finally brings the sole of the foot to the floor. This is repeated a few times upon each side.

Action.—Determining to the pelvis and lower limbs; is used in amenorrhœa.

Half Reclining—Flexion of the Knee.

(Movement of Resistance.)

Position.—The patient sits in a comfortable position, leaning far back; one leg is extended at the knee, and the lower part of the thigh rests upon a firm object, for example, the physician's thigh. The physician sits to the side of the pa-

tient, one hand placed upon her knee, the other upon the tip of her extended foot.

Movement.—By means of pressure on the toes the leg is slowly carried to a vertical position, against the patient's resistance, and then is extended by the patient, against the physician's resistance. This is repeated three or four times on each side.

Remarks.—Afterward one hand is placed upon the knee,

Fig. 31.—Half Reclining—Flexion of the Knee.

the other behind the ankle, and a short passive hyperextension performed, terminating in a vibratory movement in order to relieve the tired feeling in the extensors.

Standing High, Supported—Drawing the Leg Forward.

(Movement of Resistance.)

Position.—The patient stands upon a stool or chair, with the hands or back supported against some object, one leg held loosely and turned a little backward. The physician stands in front of the patient, with one hand behind the patient's ankle, the other acting as a support against the hip (*vide* Fig. 32).

Movement.—Against the patient's resistance the physician draws the leg forward as high as possible without changing her position, and she then restores the limb to its original

position, against the physician's resistance. This is repeated three or four times with each limb.

Action.—Derivative from the pelvis.

FIG. 32.—STANDING HIGH, SUPPORTED—DRAWING THE LEG FORWARD.

BENT FORWARD, FALLING—DEPRESSING THE LEG.

(Movement of Resistance.)

Position.—The body, bent more or less forward according to the patient's strength, is supported by the hands, which are placed against some firm object. The head is thrown back, the arms are held nearly straight, the legs entirely straight. One leg is now carried backward as high as possible, in an extended position, and without changing the position of the body in other respects. The physician stands to one side, one hand placed upon the abdomen to furnish a support, if necessary; the other hand is placed on the ankle of the raised foot.

Movement.—Against the resistance of the patient, the leg

is pressed down by the physician, and then raised by the patient, without resistance. This is repeated three or four times with each leg.

Remarks.—As a general thing I allow the patient to bend the body only moderately, so that the feet still rest entirely on the floor.

Action.—This manipulation acts, on account of the position, upon a large number of muscles of the arms, legs, and

Fig. 33.—Bent Forward, Falling—Depressing the Leg.

anterior surface of the trunk. The manipulation itself acts still more vigorously on the glutæi, lumbar, and posterior thigh muscles. It is strongly derivative from the pelvis.

Half Reclining

(Movement of Resistance.)

Position.—The physician sits to the side with his legs separated and places the leg of the patient (who sits leaning back) upon his thigh.

a. Flexion of the Foot.—The hand (H_1) which lies nearest to the patient's knee grasps above the ankle, the other hand (H_2) encircles the anterior part of the foot from below.

b. Extension of the foot.—H_1 grasps the toes (and the anterior part of the dorsum of the foot) from above; H_2 lies below (not behind) the ankle.

c. Rotation of the foot.—Both hands encircle the middle of the foot, H_1 from above, H_2 from below.

Movement.—In *a* the foot is flexed by the physician, then extended by the patient; in *b* this is reversed; in *c* it is first rotated in one, then in the other direction, but not alternately.

Fig. 34.—Half Reclining—Extension of the Foot.

The various movements are repeated a few times and are always made against resistance.

Action.—These movements are not derivative from the pelvis, although this might appear to be true at first sight. They are often employed in patients who suffer from cold feet.

Half Reclining—Rolling of the Foot.

(Spontaneous Movement.)

The patient sits comfortably, leaning tolerably far back; the legs lie crossed upon the sofa or upon a chair, but the ankles must project.

The feet, which are held together, are first rolled around for a time in one direction in the largest curve possible; then the crossing of the leg is reversed, and the movement is repeated in the opposite direction. Is used in cases of cold feet.

Half Reclining—Separation of the Knees.

(Movement of Resistance.)

Position.—The patient sits leaning back comfortably, the feet, close to one another, supported on a firm object (such as a chair) so that the hips and knees are flexed

Two persons (physician and assistant) stand on either side

of the patient, with their faces turned toward her. One places his hands upon the inner surface of the patient's knees, the other places his hands upon those of the other individual.

Movement.—Against the patient's resistance her knees are slowly separated, the movement being conducted by the one whose hands are in direct contact with the patient; then the patient brings the knees together, against the resistance of the manipulators. The movement is repeated three or four times.

Remarks.—If necessary, this manipulation may be performed by one individual alone, especially if the patient is not very strong.

Action.—Like the more vigorous movements of the legs in general, this is somewhat determining to the pelvis unless it is associated with a derivative movement. At the present time I rarely perform this manipulation; for example, in cervical leucorrhœa in which it always precedes the manipulation next described.

Half Reclining—Pressing the Knees Together.

(Movement of Resistance.)

Position is the same as in the preceding movement. One individual stands on each side of the patient, and places his hands over those of the other upon the outer sides of the separated knees.

Movement.—The knees are slowly pressed together, against the patient's resistance, and then separated against the resistance of the manipulators. This is repeated three or four times.

Action.—Derivative from the pelvis.

Half Reclining.

(Movement of Resistance.)

Position.—The patient assumes at first the half-reclining position with the feet drawn up and the knees close together, for example, upon a sofa or a long, low couch. When the movement begins, the patient raises the pelvis until the hips are extended as far as possible, and the weight of the body is supported by the feet and the upper part of the back and shoulders.

The physician sits to one side; in *a* his hands are placed on the inner surfaces, in *b* upon the outer surfaces of the patient's knees, and his forearms are kept as parallel and close to one another as possible.

Movement.—*a.* Separation of Knees, with Lifting of the Sacrum.—Against the resistance of the patient, her knees are separated from one another, and then are drawn together, against the physician's resistance. This is repeated three or four times.

b. Pressing Together of Knees, with Lifting of the Sacrum.—The knees are pressed together by the physician against

Fig. 35.—Half Reclining—Separation of the Knees with Lifting of the Sacrum.

the resistance of the patient, and then separated by the latter, against resistance. As a general thing the movement is repeated three or four times; in a few cases it is continued somewhat longer but less vigorously.

Remarks.—The patient may not exert herself to such an extent that she no longer breathes quietly; otherwise the blood will be determined to the head.

Action.—The first movement, especially when the patient strives vigorously to keep the hip joints as extended as possible, causes active contraction of all the muscles of the floor of the pelvis. Not alone can the strengthened muscles do better

service in defecation and micturition, but they offer greater resistance, during heavy work, to the pressure from above, and can thus prevent downward pressure of the uterus and stretching of its ligaments. These movements are employed, immediately after lifting of the uterus, in prolapsus of the uterus and vagina, rectocele, cystocele, and retroversion of the uterus.

But my experience does not favor the view that this movement alone can cure prolapsus. Nor is it necessary in order to secure permanent recovery of prolapse, inasmuch as I had cured nearly forty cases before I became acquainted with this movement.

The coincident activity of the muscles of the back prevents any notable determination to the pelvis. Indeed, if it is associated with pressing together of the knees, it will cause vigorous derivation. The latter movement always causes derivation from the pelvic organs. It is employed immediately after the local treatment of hemorrhages, exudations, and fixations. As soon as these have disappeared so that we may begin, if necessary, with lifting of the uterus, these movements are performed in succession immediately after the lifting.

Percussion of the Loins, Sacral Percussion.

Positions.—a. Supported, Standing.—The patient stands erect, lightly supported against some object (for example, a wall), by means of the outstretched hands, the head held back, the slightly separated legs turned a little in.

b. Bent Over, Falling.—If the patient, in the position just mentioned, pushes the feet backward, a part of the weight of the body must fall upon the arms, and active contraction of the muscles of the anterior surface of the body becomes necessary in order to keep the body straight. This is so much more the case, the more the body is inclined; then the arms are no longer kept horizontal, but perpendicular to the line of the body.

c. Bent Over, Sitting.—The patient sits with separated thighs, the trunk inclined forward, and the outstretched arms lightly supported against some object.

d. Swimming Position.—The patient lies on a couch upon her abdomen. One assistant grasps the outstretched arms,

another grasps both feet. They now pull vigorously in opposite directions, and thus lift the patient's hands and feet, so that her passively extended body forms a long arch, which is supported, to a certain extent, by the abdomen on the couch.

Movement.—The percussion is effected by repeated blows with the loosely doubled fist. The left hand, affording support, is applied to the patient's abdomen, the right arm is held

Fig. 36.—Supported Standing—Sacral Percussion.

against the manipulator's own trunk; the wrist is held loosely and the bent fingers should act like springs.

1. Percussion of the Loins.—A series of blows (about five) are applied three or four times in a curved line, on each side, from above downward, starting from the first lumbar vertebra, at first downward, then more to the outside.

2. Sacral Percussion.—A series of blows (about seven) are applied three or four times from above downward. The line of impact extends obliquely from above and externally downward and internally across the lateral part of the sacrum, from its upper extremity to the coccyx.

Remarks.—The degree of inclination in position *b* varies according to the patient's strength, but is never so pronounced that the soles of her feet do not remain entirely upon the floor.

After the percussion, stroking the back with the palm of the hand is usually performed a few times.

Action.—The entire manipulation is stimulating to the nerves which supply the pelvis. Percussion of the loins is employed in uterine displacements; sacral percussion is also used to increase the supply of blood to the pelvis, and to stimulate the bladder, rectum, and vagina. If sacral percussion is performed vigorously in position *a*, it increases the flow of blood to the pelvis and may even give rise to uterine hemorrhage. If it is employed mildly in position *b*, it stimulates the pelvic nerves and also increases the absorption from all the pelvic organs. The position and vigor of application must be adapted to each individual case.

In patients with severe hemorrhages who are too feeble for position *b*, but in whom vigorous stimulation of the pelvic nerves seemed necessary, I have employed position *c* and performed sacral percussion very mildly. Position *d* is used chiefly in hemorrhoidal affections.

Fig. 37.—Supported Standing—Percussion of the Back.

Supported Standing—Percussion of the Back.

(Passive Movement.)

Position.—The position is the same as in Fig. 36.

Movement.—The physician, who stands behind the patient, delivers alternating blows with the outer border of the little finger, the hands being held parallel; the blows pass along each side of the spine, down the back, and are repeated a few times. The fingers must be kept separated in order that they may act like springs; we must avoid striking with the edge of the middle of the hand. The blows must be feeble in the back of the neck and increase in vigor as they pass downward.

Action.—It stimulates the nervous system in general. I employ it in uterine displacements, etc., associated with percussion of the loins and sacrum, in order to stimulate the pelvic innervation as much as possible. According to Branting's statement, it should be avoided whenever palpitation of the heart is to be feared.

CHAPTER IX.

MENSTRUATION.

A. Gymnastic Treatment during Menstruation.

It may often be noticed that movements exert an influence upon the profuseness of the menses, especially during and shortly before menstruation. It is more difficult to determine in what way a certain movement acts. Simple walking, if excessive, may act differently under different circumstances. In a strong healthy person, who is accustomed to walking, it generally diminishes the flow of blood to the uterus, and this is explained by the derivative effect of muscular activity. But if the individual is weak and the uterine vessels flaccid, the hemorrhage will be increased, perhaps on account of the increase in blood pressure induced by the strain. Continued arm work acts still more strongly in diminishing menstruation. In many vigorous individuals, even dancing diminishes the menses very decidedly, especially if they have been very profuse.

In the majority of cases I omit, during menstruation, those manipulations which facilitate defecation, because the bowels are usually looser at that time. I also inquire whether the menses are more abundant or scanty than formerly. If more abundant, I omit all determining movements; if more scanty, these movements are continued. Determining treatment against amenorrhœa is employed only until the menses again begin, but it may be continued in a more moderate form if the menses are still scanty.

After Dr. Nissen began, in 1874, to employ local treatment during menstruation, I also made this experiment, and recommend the plan very highly. But I must lay emphasis on the fact that, at the menstrual period, massage should be employed with a more gentle and delicate touch and for a shorter period, especially as the patients are then much more sensitive than usual. Among thousands of patients I have never

observed any bad results. Hence I am convinced that this experience will be confirmed by all who treat their patients during menstruation, provided that they act with the same caution. But I would recommend local treatment during menstruation only if general gymnastic treatment is given at the same time.

During the stay of Dr. Nissen and myself in Jena, in the autumn of 1886, our work was constantly controlled for two and one-half months by Dr. Skutsch who was at the start somewhat biassed against us. Our treatment was employed so exclusively that not even a desirable enema was given. The treatment was also continued during menstruation and no injurious effects were observed. A patient with prolapse who, on the day before she began our treatment, had been sounded, under chloroform, by several physicians (who wished to convince themselves that the uterine cavity was fourteen centimetres long), suffered in consequence from a not inconsiderable prolapse. This hemorrhage ceased on the first day after our treatment. In his favorable review, Dr. Skutsch made no mention of any bad results from our treatment during menstruation.

My reasons for such treatment during menstruation may be summed up as follows:

1. If this plan is carried out with caution and moderation, it is never injurious but, as a rule, accelerates recovery. If local treatment is discontinued during menstruation, recovery is undoubtedly delayed. If pains are present which increase during menstruation, they may be relieved very much by the treatment.

2. Abnormal hemorrhages are often restored to the normal. Not alone in small but also in very large fibromyomata, in large metritic swellings, and in the sometimes very profuse hemorrhages occurring in a small (atrophic?) uterus this has succeeded, as a rule, so that no treatment could be more satisfactory. In severe cases I have even derived benefit from repeating the treatment twice a day. As a matter of course, nothing can be done in this way in cases of cancer.

3. Under appropriate treatment exudations diminish more rapidly during menstruation than in the intervals, and they sometimes undergo very marked exacerbations if treatment is discontinued at the menses.

4. Fixations are loosened more certainly and readily during the menses than in the intervals, although special caution is necessary in making these internal detachments during menstruation. Certain fixations, which can never be changed in the intervals, may possibly be loosened gradually during the menstrual epochs.

5. In prolapsus and displacements the enlargement and increased weight of the uterus during menstruation and the relaxation of surrounding parts are an especial reason for restoring the organ to its normal position at that time and for strengthening its supports, in order that the good effects already gained should not be lost. But here, also, the treatment must be milder and briefer than in the intervals. In the treatment of posterior displacements I find constantly that reduction is more difficult on Mondays (treatment having been discontinued on Sundays). If the uterus would remain retroverted during the entire period of menstruation and the ligaments were thus relaxed, we might as well discontinue the useless labor. It has been claimed that the treatment of these cases is very dangerous, apart from the inconvenience to the patient and physician. If we confine ourselves to reduction, done gently and painlessly by an expert hand, or add only gentle, brief massage of surrounding parts, I have seen only good results follow.

I ask the physicians who have visited me and have observed my plan of treatment for periods varying from a week to two months, whether they have ever observed any bad results from my treatment during menstruation.

B. Dysmenorrhœa.

Narrowing or rigid flexion of the cervix, *i.e.*, a mechanical obstruction, has been mentioned among the causes of pain in menstruation. Others have assumed that at least the pains which precede menstruation are the result of the pressure exerted upon the walls of the vessels when the blood is prevented, as is often true in endometritis, from escaping into the uterine cavity. Metritis, endometritis, or an exudation in the vicinity of the uterus is often regarded as the cause of dysmenorrhœa. Inflammations of the tubes and ovaries also give rise to dysmenorrhœal symptoms, which may sometimes be-

come very violent. Hence the treatment varies with the different cases.

It is well known that the blood can trickle through the finest openings, but that after coagulation its passage, even through larger openings, is prevented. Relying on this fact I have attempted to secure painless menstruation for those patients who suffered from the first-mentioned form of dysmenorrhœa, and I have succeeded even in cases in which the stenosis did not permit the introduction of an ordinary fine silver sound. One patient had suffered, in previous menses, from ice-cold hands and feet, with a rush of blood to the head and dilatation of the pupils, and violent spasmodic pains in the abdomen, lasting several hours. I assumed that if, for a few days prior to menstruation, the blood were vigorously determined to the pelvis by means of daily gymnastic movements so that the blood would appear more rapidly and in larger quantity during menstruation, it would also make its way more easily through the stenosis. The patient was, therefore, treated by means of suitable manipulations. In the subsequent menstrual periods the pains did not appear.

In the other form of dysmenorrhœa the inflammatory conditions must first be relieved and then, if necessary, derivative movements made. Under such treatment I have seen the menstrual pains in various diseases disappear for many years.

In many cases the pains do not start from the uterus or, at least, they depend upon the condition of the surrounding parts. In uterine displacements the pains are sometimes very slight or absent during the intervals, but increase considerably at the menses. On the one hand, the displacement itself may interfere to such an extent with the vascular and nervous activity of the uterus that the nerves are irritated by the congestion; on the other hand, the nerves may be directly irritated in the shrunken, twisted, or otherwise displaced supports.

It is evident that in such cases the radical cure of the dysmenorrhœa depends upon the complete removal of these abnormal conditions. But as the intensity of the menstrual congestion plays a prominent part in the development of the pains, a not inconsiderable, sometimes even a very marked improvement may be effected by derivative treatment.

A suitable formula would read as follows:

1. Standing in the walking position—flexion of the head and arm (page 61).
2. Standing bent backward—flexion and extension of the knees (page 88).
3. Standing bent backward—rotation of thigh (page 86).
4. Standing supported—percussion of back and loins, done quite vigorously (page 97).
5. Sitting in riding position—rolling of the trunk (page 77).
6. Sitting bent—alternate rotation (page 75).
7. Kneeling bent back—screw rotation (page 71).
8. Half-reclining—flexion of knee (page 89).
9. Standing supported—sacral percussion (page 97).
10. Standing—tension of the chest (page 66).

One patient stated that if she felt pain at night in the small of the back while in dorsal decubitus near the approach of menstruation, the pains disappeared upon lying on the abdomen.

If severe subjective symptoms occur at the normal intervals, but no hemorrhage has ever appeared, an examination must be made as to the existence of atresia or other malformation, and such cases must be relegated to the gynæcologist.

Self-treatment.—In many cases in which the patient has no opportunity of receiving suitable gymnastic treatment from skilled hands, considerable benefit may be derived in various menstrual disturbances by suitable active movements which may be performed without assistance. When vigorous sacral percussion is useful, it may be administered by any one around the patient.

A patient with very painful menstruation was successfully treated in the following way: during the last week before menstruation, the legs and feet were rapidly washed every day with a towel dipped in cold water and at once dried by pressing without rubbing; then water was applied to the small of the back and the external genitalia, which were dried in the same way. She then walked about, stamping and drawing the knees up high, until the parts which had been washed became warm. Then the following movements were performed: 1, sacral percussion (*vide* p. 97); 2, rotation of thighs (*vide* p. 86); 3, standing supported—flexion and extension of knees (*vide* p. 89); 4, rotation of foot (*vide* p. 93). As soon

as the menses appeared, the hydropathic treatment ceased, but the movements were continued.

In such cases we might add: kneeling, falling backward (*vide* p. 72) or kneeling low, drawing backward, performed by any one in the family.

It is, perhaps, not superfluous to add that such treatment cannot be successful or permissible in cases in which the dysmenorrhœa is associated with fixations or exudations of the uterus or its appendages.

C. Amenorrhœa.

If a girl has never menstruated or suffered from periodical pains which might indicate that the menses are about to begin, she is treated, provided that she is normally developed externally, with determining movements, especially if she suffers from a rush of blood to the head. In such cases, however, caution demands that we convince ourselves that no abnormal conditions prevent menstruation, before more vigorous treatment is adopted.

If a woman, who has previously menstruated normally, loses the menses from accidental circumstances, for example, a cold, especially when it affects the lower limbs, we must first examine carefully whether an inflammatory swelling can be discovered in the pelvis. In such cases it is best to relieve all swelling and tenderness, even in mild cases, by means of massage. Then determining movements, which grow gradually stronger, are employed; at the start we must first assure ourselves by daily brief massage that the tenderness has not returned. The movements are intended to convey the blood to the pelvis and lower limbs.

It is difficult to give a characteristic feature which will hold good for all pelvic determining or derivative movements. But it appears as if those movements which increase the flow of blood in the lower limbs and in which an increased current of blood circulates through the common iliac arteries (movements of the feet, knees, and thighs) also give rise, in general, to increased blood pressure in the pelvis. However, pulling the leg forward and pressing the knees together act as derivative measures. The movements which are associated with activity of the abdominal muscles in suitable positions

are usually determining. The position of the body here plays an important part. In many movements it is especially important to maintain an arched position of the trunk, with marked projection of the pelvis.

The following are a few illustrations of gymnastic treatment against amenorrhœa.

A. Less vigorous (a derivative movement is also introduced).

1. Standing—flexion of head and arm (p. 61).

2. Half-reclining—kneading of legs, flexion and extension of foot (p. 64 and 93).

3. Half-reclining—flexion of knee (p. 89).

4. Supported standing—percussion of back and loins (p. 97 and 98).

5. Half-reclining—rotation of thigh (p. 84).

6. Sitting riding—rotation of trunk (p. 77).

7. Sitting bent—alternate rotation (p. 74).

8. Kneeling low—screw rotation (p. 71).

9. Sitting relaxed or standing—raising the chest (p. 65).

B. More vigorous.

1. Supported standing—alternate rotation (p. 68).

2. Standing bent backward—flexion of the knee (p. 88).

3. Standing bent backward—rotation of the thigh (p. 86).

4. Standing supported—percussion of loins and sacrum (pp. 96 and 98).

5. Sitting in riding position—rolling the trunk (p. 77).

6. Kneeling low—screw rotation (p. 71).

7. Standing supported—sacral percussion (p. 96).

8. Standing—tension of the chest (p. 66).

Other determining movements are, for example:

Half-reclining—swinging the knee up (p. 86).

Half-reclining—pushing the knee down (p. 87).

When molimina appear without hemorrhage, I have several times attempted to exert a direct irritation on the uterine mucous membrane in the following way. A sound is passed in and out very cautiously and slowly through the uterine canal for a few times, while a fine vibratory movement is made with it in a transverse direction. At the end of a few hours a hemorrhage occurs, and this leads to complete menstruation on the following day under ordinary treatment. In some cases it was also necessary to introduce the sound on the second day. During this manipulation the patient experiences

no pain, but merely a general nervous feeling which appears to start from the region of the uterus.

It is interesting to observe that young girls who were very pale and feeble on account of chlorosis, rapidly resume their good color and health after the previously scanty or absent menses have become more profuse.

When the uterus is enlarged it may often be necessary to desist from determining movements on account of the fear of pregnancy. When menstruation has ceased from other causes, the uterus is generally small rather than large. On the other hand, enlargement of the uterus is often associated with excessive hemorrhages, when they are not due to pregnancy.

Self-treatment may also be employed at times with good results. The feet and legs are rapidly washed with cold water and then dried without rubbing; then the genitalia and sacral region are treated in the same way. Immediately afterward the patient must walk about until the parts have again become warm. Then a series of determining movements are made, for example:

1. Standing—lifting the arm with deep breathing (p. 65).
2. Half reclining—rolling of the foot (p. 93).
3. Supported standing—alternate lateral flexion (p. 67).
4. Standing on one foot—flexion and extension of knee (p. 89).
5. Standing extended—bending forward and backward.
6. Standing on one foot—rotation of thigh (p. 86).
7. Standing with fixed hips—rolling the trunk (p. 78).
8. Kneeling—falling backward (p. 72).
9. Walking about and drawing up the knees.
10. Standing—lifting arms during deep inspirations.

D. Menorrhagia and Metrorrhagia.

Abnormal hemorrhages occur, in general, in diseases of the uterine mucous membrane, often also as the result of special morbid formations; for example, polypi, fibromyomata, etc. In the former event the uterus may either be small (atrophic) or enlarged, but it is often quite normal in size. In these conditions we employ movements (chiefly active) which determine the blood upward to the muscles of the chest, arms, and back, and also downward to the posterior muscles of the thigh. If

the hemorrhage is not very profuse, liftings of the uterus with more or less pressure are combined with the movements. The main treatment, however, consists of gentle, brief massage of the uterus. All movements are made in proper succession. If a polypus is present, the same treatment may be employed, either soon after its removal or later, but always with the greatest caution.

In severe hemorrhages the uterine massage must be done very gently; we only attempt to stimulate the vessels to contraction. In the main, the corpus uteri is masséed, but if, as is usually the case, the portio vaginalis is enlarged after protracted hemorrhages, this part is also subjected to treatment.

When the uterus is hard and more or less enlarged, recovery was formerly very slow, and five to eight months or even longer usually elapsed before notable improvement of the condition occurred. It often happened that complete restoration of the former size of the uterus could not be attained, but the hemorrhages and other symptoms disappeared, and the patient's strength increased so that she felt entirely well. Recently I have found that stretching of all fixations, however slight, results in more rapid success, even with regard to the abnormal enlargement of the uterus. As the hemorrhages diminish or cease, the massage must become more vigorous.

One of my patients remained apparently well for four years after such a course of treatment, and was able to return to her ordinary occupation. After a cold, violent hemorrhages again appeared and necessitated two months' treatment. When this patient came under treatment the second time, the uterus was about the same size and consistence as at the close of the first course of treatment.

Another patient suffered from hemorrhages at the slightest exertion, and also experienced a feeling of heat in the body so that she could tolerate no bed-clothes at night, and in the daytime could only wear a loose dress. The uterus was quite hard, fixed, and very large. After treatment for five months the menses became normal, the uterus was of the size normal to multiparæ, but was somewhat firmer. The same conditions were observed on examination a year later; this patient was married but had never borne children.

After protracted profuse hemorrhages, the uterus sometimes exhibits a pronounced spongy enlargement. In addition

to derivative movements, gentle massage must then be employed in order to stimulate the vessels to contraction through the agency of the nerves. This gentle massage must be made with the greatest caution and must be continued until the uterus has become firmer and no further hemorrhages are to be feared.

In severe cases in which the patient's strength appeared to be too slight and especially when, at the start, the hemorrhage was temporarily increased by the massage, I formerly regarded it as best to transfer the treatment to the hands of a physician. In one case, in which this could not be done, and I was therefore induced to continue, I found that the hemorrhage ceased if the massage consisted only of gentle rubbing, without pressure, and was continued for a very short time. This observation has since been confirmed in other cases.

In profuse hemorrhages which lasted years, I have several times found a very small, soft, and flabby uterus. In these very cases gentle massage is the most effective, while more vigorous manipulation often increases the hemorrhage. Some of these patients had never given birth to children.

As I have repeatedly masséed, with success, continued severe hemorrhages after abortion, a few examples may here be adduced. In 1875 I treated a woman of 31 years, who had not left the bed for several weeks on account of persistent bleeding. At the end of two days she arose, on the third she visited me (going up and down a flight of stairs), and at the end of eight days she had recovered. In the same year a woman, æt. 34 years, had hemorrhages after an abortion, lasting from February to the end of July, at which time she came under my treatment. Previously she had been treated for a time in the hospital where it had twice been necessary to use a tampon. On several occasions she was apparently so near death that her husband received leave of absence from the military manœuvres in order to visit her. In order to be taken home, which the physician declared could not be done without danger to life, she asked for her discharge. Shortly before my first visit she had bled a great deal. After the first treatment the hemorrhage became less, after the third it ceased entirely, and after the fifth the patient could walk around in her room. The treatment was continued a month.

No further hemorrhages occurred, and since then the menses have remained normal, lasting four or five days.

When the patients are weak and confined to bed, they must be treated in bed. As the following method has proved very successful in such cases, I will describe it in detail:

During the treatment as well as at other times the patient must carefully avoid raising herself in such a way that the abdominal muscles are called actively into play. If she must sit up, this should be done either entirely by others or by first turning carefully into abdominal decubitus and then raising herself with the aid of the arms and knees. During the treatment the patient assumes the dorsal decubitus; in the intervals she must remain, as much as possible, on the side, with the thighs drawn up. The treatment is carried out twice a day and consists of five movements, of which the first and fifth, and the second and fourth, are alike.

1. The physician stands at the head of the bed, grasps the patient's wrists, and performs double rotation of the arm (p. 63), terminating in a position in which the arms are flexed at the shoulder and elbow, and the hands are approximately at the level of the shoulder; now the arms are drawn up against the patient's resistance until they are extended, with the elbows turned toward the sides. Then the patient brings the arms into their former (flexed) position, against the physician's resistance. This manipulation is repeated two to three times.

2. The physician stands at the side of the bed, looking toward the head, in such a way that one foot rests upon the floor, the other leg kneels upon the bed. Now the hands are placed on the back of the patient's neck and a little between her shoulder blades, and she is raised into the sitting position against her resistance. Then the patient returns to her former position against tolerably vigorous resistance. This is repeated three or four times. Great care must be taken that the abdominal muscles do not come into play. This is apt to occur unless a forward pressure is exerted uninterruptedly upon the back of the neck, and is discontinued only after the patient again lies down.

3. In the ordinary lithotomy position with raised head, gentle massage is applied with short interruptions for a few minutes; if necessary, the uterus is first reduced. 'It seems

to be a matter of some moment to divert the attention of the patient, by conversation, to other subjects.

The fourth manipulation is the same as the second, the fifth the same as the first.

In vigorous women we may add pressing together of the knees, with raising of the sacrum, to the third manipulation.

As soon as the patient has left the bed, we may continue with the following treatment:

1. Sitting bent over—flexion of arms.
2. Rotated sitting—anterior rotation.
3. Sitting bent with raised arms—alternate rotation.
4. Half reclining—massage of uterus and vicinity.
5. Half reclining—pressing together knees and elevation of sacrum.
6. Sitting bent with raised arms—alternate rotation; and standing bent over—flexion of arms.

It is, perhaps, not superfluous to mention that this treatment should be employed not alone during the hemorrhages but also in the intervals. If it becomes necessary for the patient to rise during treatment, she must be helped from dorsal decubitus.

When there are no exudations in the pelvis, a moderate, brief pressure may be exercised, even in tolerably severe hemorrhages, upon the hypogastric veins, first on one, then on the other. This pressure ends in a gentle stroking movement upward along the course of the vessel. The pressure on the veins is always preceded by gentle massage of the uterus and broad ligaments in the direction of the veins.

When abnormal hemorrhages occur in displacements or prolapse, in which it is necessary to strengthen the floor of the pelvis, I have employed, immediately after the massage, a few mild separations of the knee (with elevation of the sacrum), and then three or four more vigorous "pressing together of the knees" (also with elevation of the sacrum). It seems to me as if the derivative action is more vigorous than formerly, when I employed only the latter movement. On the whole my experience indicates that a derivative effect is obtained more surely if the more adjacent parts are first brought into action, and then the more remote parts.

Hence the local treatment in displacements with severe hemorrhages is usually carried out in the following order.

First the uterus is reduced, then masséed; then follow pressures upon the hypogastric plexuses and veins, immediately afterward a few separations of the knees, and finally three or four pressings together of the knees (the former in order to place the uterus more firmly in its proper position, the latter in order to act derivatively). On standing up and for a short time afterward one finger is kept applied to the anterior surface of the portio vaginalis in order to assure the forward position, because if the corpus is at once thrown backward the hemorrhage may soon return more violently. With the other hand the patient is vigorously assisted in rising, so that she does not need to make the abdominal muscles tense.

As soon as the violence of the hemorrhage has somewhat diminished, any lifting of the uterus which may be necessary is performed immediately after reduction in the treatment just mentioned.

In general the movements which act derivatively from the pelvis appear to be those in which the arm muscles, and still more the back and chest muscles, together with the external rotators, abductors, or extensors of the hip-joint are brought into activity.

In one case of menorrhagia in a woman of 40 years, the abdominal walls were so thick and rigid that it was impossible to treat her in the ordinary way, *i.e.*, massage of the uterus through the abdominal walls was impossible. I then made my sole attempt to perform uterine massage through the vagina, the patient lying on the side with the legs drawn strongly upward. It was, however, impossible for me to reach high enough to expect any benefit from the massage, so that I stopped after three sittings. I then continued the ordinary general and derivative movements, in order to increase the vascular activity throughout the body. The following movements were performed:

Sitting bent over—flexion of arms.

Half reclining—kneading of legs and flexion of foot.

Half reclining—flexion of knees.

Sitting bent over—alternate rotation.

Half reclining—pressing together knees with elevation of sacrum.

Sitting bent over—alternate rotation and flexion of arms.

The patient was treated for about a month on two occa-

sions, and each time the hemorrhage ceased. In the five years which elapsed between the two attacks, the menses were tolerably normal; after the last treatment they were very scanty for a time.

As the treatment of this affection is attended with danger, it would be desirable that only theoretically educated gymnasts, at best physicians, should undertake such treatment.

If constipation is associated with the abnormal hemorrhages, I never prescribe standing—transverse abdominal stroking, but some other manipulation, for example, sitting relaxed—transverse shaking of the loins.

As a general thing the following scheme is indicated in the treatment of menstrual anomalies with coincident parenchymatous changes in the uterus:

1. Uterus large, hemorrhage scanty; at first mild, soon more vigorous massage; no determining movements.

2. Uterus large, hemorrhage excessive (either profuse or too protracted); gentle massage, derivative movements.

3. Uterus small (more or less atrophic), hemorrhage increased; the mildest possible massage and derivative movements.

4. Uterus too small, hemorrhage scanty; mild (irritating) massage and determining movements.

Self-treatment.—Efficient self-treatment, such as is possible in amenorrhœa and dysmenorrhœa, cannot be obtained. The following manipulations act somewhat in this direction:

1. Standing; extending or throwing the arms upward (performed quite vigorously).

2. Sitting bent over, alternate rotation (this movement is made to correspond to the movement of resistance described on page 68).

E. Menopause. Diseases After the Menopause and Before Puberty.

If, in a woman of forty-five years or somewhat younger, the menses have remained absent for two or three months, but no other disturbances, which usually accompany the menopause, have set in, menstruation can sometimes be restored within a month, by means of determining movements, if the patient is still vigorous. As a matter of course we must first

assure ourselves that no local affection has prevented menstruation or could be aggravated by such treatment.

At the period of the entire cessation of the menses, but sometimes not until a year later, many patients are annoyed by violent rushes of blood to the head, with or without diaphoresis. In some of these cases the feet are always cold, because the vascular and nervous activities have not yet entered into their new sphere of action. The onset of this condition may then be accelerated by means of gymnastics, which should cause derivation from the head and increase the vascular and nervous activity in the limbs (particularly the lower limbs) and the back. Much importance also attaches to furthering the movements from the bowels, without increasing the vascular and nervous activity in the pelvis.

A distinction must be made between old and comparatively young women, also between strong and feeble women. If the patient is still young and vigorous, it is sometimes most advantageous to attempt to excite menstruation again. In vigorous and full-blooded individuals, in whom the menses begin to be more infrequent and scanty, and the lower limbs are cold, in whom increased color in the face, glistening eyes, and excited mood make their appearance, it is never permissible to determine the blood upward from the pelvis. The blood must always be determined vigorously toward the lower limbs, even at the risk that the menses will continue for several years. As a matter of course, movements which determine the blood very actively to the pelvic organs are avoided.

The treatment of other diseases of the pelvic organs during the menopause is carried out as at other times.

The treatment of various diseases, such as prolapse of the uterus and vagina, incontinence of urine, etc., may also be called for at a more advanced age. The recovery of prolapse sometimes takes place with surprising rapidity, but in the majority of cases the prognosis is poorer than in younger individuals.

It goes without saying that young girls will rarely be treated before the age of puberty. I have treated only on account of leucorrhœa, and, in one case, enlargement of an ovary.

If the affection is not very severe, it is best to begin with general tonic treatment of the entire body. The chief impor-

tance attaches to strengthening the muscles of the neck, back, and chest and the external pelvic muscles, and thus to cause derivation of blood from the pelvis. The appetite and bowels must be stimulated, and, during the summer, baths should not be neglected. Locally only tepid washings should be employed for the sake of cleanliness.

A few examples of local treatment may here be adduced.

A girl of thirteen years had suffered from profuse leucorrhœa, despite medical care. I treated her according to the above-mentioned plan, but added a few special movements, viz., standing supported—very mild percussion of the back and loins, and massage of the uterus, which was performed very gently through the abdominal walls, in the half-reclining position, the support being furnished per rectum. Improvement soon set in, and at the end of five weeks the discharge had ceased; the general treatment was continued a little while longer. The patient remained well.

A patient who was under treatment for ovarian disease, brought her daughter of thirteen years, whose symptoms were said to coincide with those of the mother. On examination (through the rectum) I found the child's left ovary as large as a walnut. The patient was treated with the above-mentioned general treatment and massage of the ovary. She improved rapidly, so that in a short time she returned home free from suffering. The ovary, however, remained somewhat enlarged.

CHAPTER X.

PREGNANCY.

It is evident from what is said in this book that the treatment of the uterine diseases favors conception in proportion as we succeed in relieving the diseases and abnormal conditions which are regarded as obstacles to the desired end.

Although the conditions necessary to conception are still unknown in part, all are agreed that it requires the entrance of semen into the uterine cavity, and this depends upon the healthy condition of the female sexual organs.

The question may be raised whether it is proper to employ local treatment after a woman has become pregnant. I have never observed any bad results from cautious treatment during the first months of pregnancy. When the pregnant uterus is unusually tender, and the patient suffers from spontaneous pains, I have employed brief and gentle massage to good advantage, especially at the beginning of pregnancy. My experience makes it probable that the periodical recurrence of abortions may be prevented by treatment with movements, massage, and strokings. I was first led to entertain this view by the following occurrence. A woman who had married rather late had an abortion in the first two pregnancies, at the same period. She was confined to bed and was treated by me for general weakness and falling of the womb. After recovery, she soon became pregnant again. At the same period as in the two former abortions, she awoke at night and noticed the usual beginning of another abortion. She then instructed a servant to perform the uterine liftings, which I had formerly employed, and these were continued for two weeks. The signs of the threatening abortion soon ceased and the pregnancy ran the normal course.

Mrs. R., æt. 30 years, in the third month of her first pregnancy suffered from retroversion of the uterus; since the age of seven years she had suffered from rectal prolapse. After

a month's treatment the uterus was anteverted and the prolapse was cured.

Mrs. W., æt. 22 years, in the third month of her first pregnancy, has pain in the swollen left ovary and repeated small hemorrhages. After twelve days' treatment the symptoms disappeared, pregnancy ran its normal course, and a healthy living child was born.

Mrs. E., æt. 34 years, in the second month of her third pregnancy, was treated for enlarged and painful ovaries. In accordance with my advice, the treatment was continued into the second half of pregnancy. Labor was said to have been unusually easy.

Mrs. P., æt. 30 years, and very vigorous, in the third month of her second pregnancy. Married in November, 1878; aborted in the second month, on March 3d, 1879; last menstruation on May 25th of the same year. After walking up and down stairs a good deal, abdominal pains set in on August 2d, 1879; in addition there was slight hemorrhage. After a careful treatment, the hemorrhage ceased. On the following day she incautiously jumped from a boat and ran up a steep declivity. Soon after returning home, another hemorrhage occurred, and was checked at once after similar treatment. On August 4th the patient ran up and down a hill; the feeling of "pressing downward" was then increased, and slight pains set in. These symptoms disappeared under the ordinary treatment. After this the manipulations were performed twice a day until August 10th, then daily for two days. Abortion did not occur. At the first examination the os was found closed and turned backward, the uterus was very soft and considerably swollen, so that it extended nearly to the umbilicus, and also spread on both sides, where a small nodule was felt on each side near the ilium; this was regarded as an enlarged ovary. All the parts were more tender than normal during pregnancy. After the relapse on August 4th, the portio vaginalis had fallen farther forward and downward. These circumstances led me to infer that the pregnancy had at least reached the fourth month. I was therefore greatly surprised at the rapid diminution in the size of the parts after continued treatment, so that on August 10th the uterus was firm and normal in size and all other enlargements had disappeared. The patient was advised to keep more quiet and especially to eschew work

in the kitchen, but she was permitted to walk about the room and yard. Her treatment consisted of: sitting bent over forward—flexion of arm; bent over, sitting—alternate rotation; massage of the uterus, especially the cervix and surrounding parts; lifting of the uterus, mainly from the sides (third form); massage; sitting bent—alternate rotation; sitting bent over forward—flexion of the arms.

Miss N. B. had been successfully treated by me, prior to her first pregnancy, for tenderness and enlargement of the left ovary, but the size of the organ was only diminished to a slight extent. Two months after the first confinement the ovary was somewhat smaller. At about the fifth month of her second pregnancy she sought my aid concerning a severe burning pain in the left inguinal region, which she attributed to the pressure of the child. On examination I found that the fœtus pressed deeply against the bones of the left side of the pelvis, but there was also a small and very tender swelling in that region. After treatment for three or four days the swelling and pain disappeared. She was then treated for a month for cervical catarrh and ulcerations, and returned home well. Two years later she remained well; the left ovary was reduced in size, but was still somewhat enlarged.

At the beginning of pregnancy it happens not infrequently that the growing uterus causes a sensation of burning pain by pressure upon the vessels and nerves. In order to produce some change in the position of the uterus in such cases I have employed mild uterine liftings (third form). They must be performed cautiously, with fine vibratory movement, in such a way that the organ is not squeezed between the hands nor against the sacrum, but is merely lifted. I have found that not alone does this relieve the pain, but that the patients are also able to walk better.

In some pregnant women we find large varicose veins, not alone on the legs, but also on the genitalia, and they may be very different in size in different pregnancies. In many cases in which lifting of the uterus was performed for other reasons, the patients have stated that the tension of the varices diminished.

I also believe it is advisable for women to take general gymnastics during pregnancy, even if they do not complain

of feeling ill. Many women, who have a feeble appearance and grow thin during pregnancy, have large children and difficult labors, regain their strength very slowly, and do not become good nurses. Others, who become stronger and more robust during pregnancy, often give birth to smaller children, have a more easy labor, recover more rapidly, and make better nurses. As we also see that the children of women who are forced to work during pregnancy are often born with small heads, and that parturition is then, as a rule, much easier than in the case of women who do no work, this alone should lead us to expect benefit from a rational movement cure during pregnancy. We attempt to improve the nutrition of the entire body and muscular system, and also to strengthen the muscles and ligaments which undergo the strain during parturition. Vigorous movements in which the ilio-psoas muscles are brought into play must be avoided.

De Ron, one of our best gymnasts, has had the same experience in many cases. Two patients, who had been treated by him until shortly before confinement, informed me that these confinements were very easy. Both had formerly had several very difficult labors.

It has also been proven in several cases that the secretion of milk may be diminished or increased by suitable movements.

I have also reason to believe that gymnastic treatment may be useful when the puerperal period runs an abnormal course, although I have had but little experience in this field. In one case in which the uterus remained considerably enlarged two weeks after delivery, a gymnast applied treatment which I had the opportunity of observing on one occasion. I noticed that he pressed the uterus quite vigorously though not forcibly against the symphysis, and heard later that, in addition to this manipulation, the only method adopted was massage with both hands, through the abdominal walls, of the very large, anteverted uterus. Such treatment appears to me to be dangerous. The delayed involution of the uterus must result from considerable diminution in the activity of the centripetal vessels, and hence there must be a distinct obstacle to the circulation of blood away from the uterus. Hence, careless pressure may result in hemorrhage.

In a similar case I would recommend the following plan:

at first double rotation of the arms (p. 63), which also stimulates the secretion of milk; then gentle local massage. This begins on both sides of the promontory, then passes downward along the pelvic walls, but always in a direction from below upward. Then the entire uterus is carefully masséed in the ordinary way with gentle circular movements in a direction toward the pelvic walls; the massage movements are continued to the promontory. This is followed at once by pressing together of the knees, with elevation of the sacrum. Next comes a mild "sitting bent over—alternate rotation" and finally double rotation of the arm. I believe that in this way the involution of the uterus may be hastened, without danger to the patient.

CHAPTER XI.

VAGINA.

Prolapse of the vagina arises either from primary relaxation or paralysis of the vaginal walls, or secondarily as the result of falling of the womb. In the latter event it disappears as soon as we succeed, by means of lifting movements, etc., in strengthening the uterine ligaments, and thus restoring the normal position of the organ. In the former event the relief of the malady is more difficult, although I have succeeded in many cases. One example may suffice. Mrs. S. B., æt. 69 years, had given birth to three children, and some time ago had an attack of perityphlitis, since which time she complained of constant pains in this region, and insomnia associated therewith. In addition she had a prolapse of the anterior vaginal wall, about as large as a hen's egg, which I treated successfully in the winter of 1879–80. I met her by accident in January, 1881, and she then assured me that she had not since experienced any symptoms of the vaginal prolapse.

In addition to other symptoms this disease is often associated with a disagreeable feeling of patency at the entrance of the vagina, and this may be felt even before a distinct prolapse of the mucous membrane is noticed.

The diagnosis of beginning vaginal prolapse is not always as easy as it may seem. Even when the patient is in a standing position, the examination sometimes gives negative results, although her subjective feelings point to such an affection. We then allow the patient to strain continuously but not too strongly. In a healthy woman this will cause, at the most, an inconsiderable displacement of the vaginal walls, which disappears at once on discontinuing the abdominal pressure. In cases in which there is considerable weakness of the vaginal walls, the latter will be protruded to a more marked extent and, on cessation of the pressure from above, will return incompletely or at least slowly to their former position.

Another experience may here be mentioned. A patient who had been treated by me for prolapse of the right kidney complained of severe pains in the cæcal region and also, on bending forward, of a feeling as if something in the pelvis were pressing downward and striving to escape. The latter symptom led me to suspect prolapse of the vagina. But despite repeated examinations in the erect as well as the recumbent position, it was impossible to discover the slightest abnormality, and I advised the patient to abstain from further treatment. After an absence of two months, during which the patient did hard work and also walked up and down stairs a great deal, she returned with the request to resume treatment as the symptoms had considerably increased. Examination now showed, after straining, a marked prolapse of the anterior vaginal wall and uterus, so that the former symptoms must have been referable to the development of this disease. I again resumed treatment, and succeeded in a comparatively short time in relieving her symptoms.

The local treatment is somewhat painful, and we should avoid, as much as possible, contact with the organs of sexual pleasure. I have never employed massage of the vaginal walls (strokings or rubbings) such as has been attempted by others. At the present time my ordinary treatment is as follows:

1. Standing supported—transverse percussion of the loins and sacrum.
2. Half-reclining—lifting of the uterus (first form).
3. Hypogastric pressure.
4. Half-reclining—pressure on the pudendal nerve and shoving compression of the vagina.
5. Half-reclining—separation of the knees with elevation of the sacrum.
6. Standing supported—transverse percussion of the loins and sacrum.

By means of the first and sixth movements I endeavor to vitalize the nerves; by means of the second I stimulate the vagina to contraction and strengthen the uterine supports; the fourth acts directly on the relaxed part of the vaginal wall; and the fifth strengthens the muscles of the floor of the pelvis, especially the levator ani.

Pressure upon the pudendal nerve is made in front of the

middle of the perineum, and with a certain degree of vigor, so that slight pain is produced. The tips of one or two fingers are applied on the sides of the perineum, are pushed in to a sufficient depth, and brief pressure, attended with fine, vibratory movement, is exercised upon the nerve against the ascending or descending ramus of the pubis. This pressure is repeated two or three times at short intervals, the fingers pushing farther forward at each pressure. The fingers must be placed to the outer side of the labia majora. This manipulation is especially efficient against the peculiar "feeling of patency" in old women.

Shoving compression of the vagina is performed in the following way. The tip of the somewhat flexed terminal phalanx of the index finger is applied in the region of the introitus. Against the inner surface of the pubis, to the side of the urethra, pressure is then made upon the relaxed part of the anterior vaginal wall, the finger at the same time shoving over the part. This is repeated two or three times.

The patients should touch the prolapsed mucous membrane three or four times daily with a cloth dipped in water, and should then dry it at once without friction.

Recovery is aided materially by active exercise of the voluntary muscles of the floor of the pelvis, which should be carried out several times a day in the following manner, either in dorsal decubitus or in the erect position with some support. One leg is placed across the other and the glutæi muscles are contracted, while at the same time the pelvic sphincter muscles are contracted slowly but vigorously, so that the floor of the pelvis is drawn upward (about the same movement as we employ in retaining stool).

In a few cases I have succeeded in curing pronounced cystoceles within three or four months. In these cases the following special treatment was adopted: sacral percussion, lifting of the uterus, and compression of the pudendal nerve. In addition the patient takes a daily vaginal enema of a glass of cool water, and also washes the part two or three times a day.

Good results have also been obtained in rectocele. A few patients have even given birth to children without experiencing a relapse. In addition to sacral percussion, lifting of the uterus, and hypogastric pressure I have also employed rectal lifting, with the object of acting upon the nerves of the parts,

and of stimulating the vagina and rectum to contraction. At the present time I have amplified my treatment somewhat in the following way: sacral percussion, rectal lifting, uterine lifting and hypogastric compression, pudendal compression, finally separation of the knees with elevation of the sacrum. In addition the patient is directed to carry out, at home, the above-mentioned exercise of the pelvic sphincter muscles.

Vaginal shoving compression, performed upon the relaxed parts, also has a good influence, especially when the rectal walls are swollen. When the condition is associated with retroversion of the uterus, reduction and other treatment of the latter disease will prove very serviceable.

Hyperæsthesia of the vaginal introitus (vaginismus) I have treated, in the half-reclining lateral position, with careful daily stretching, chiefly in the direction toward the perineum, with the two index fingers inserted into the vagina; also in the half-reclining dorsal position with compression of the pudendal nerve or (per rectum) the third and fourth sacral nerves, combined with persistent compression (without rubbing) of the sensitive parts. At the start this treatment could not be carried out in some cases on account of the patient's excitability. General sedative strokings were then adopted, and were combined later with the local treatment. The manipulations close with pressing together of the knees, combined with lifting of the sacrum.

In recent times I have proceeded in the following way: At first I make slight pressure along the perineum with the anointed index finger. Then I insert the tip of the finger a little (more deeply every day) into the vulva, and then compress, first the right, then the left, wall of the vulva, as uniformly and slowly as possible. Such a slow, somewhat persistent pressure, partly on the side, partly on the most painful spot, I have found most effective. We must endeavor to gain the confidence of the patient by manipulating slowly and gently, so that no irritation is produced. According as the tension of the patient's body subsides, the pressure may be gradually increased. In this way, even the most irritable and sensitive parts may finally be treated without special annoyance.

If the patient is married, it is advisable that sexual intercourse be performed not too infrequently, as I have seen a relapse under such circumstances, in at least one case.

CHAPTER XII.

ON THE POSITION OF THE UTERUS.

In women who have borne children, retroversion is so frequent that many assume that it is as normal in multiparæ as anteversion is in virgins. If this were true, it would, as a matter of course, be wrong to restore the retroverted uterus to an anterior position, even if symptoms were present. But I have seen a number of cases in which women had given birth to a number of children (even ten, eleven, or more) and the uterus was in pronounced anteversion. In some, who had suffered formerly from uterine prolapse, but had been cured and had subsequently given birth to children, I found on later examination that the uterus had remained in an anterior position. On the other hand we find very often that posterior positions are associated with disturbances which disappear or are improved in many cases after anteversion has been permanently induced. Hence I am convinced that the retroversion in these cases is due to morbid conditions or to some accidental cause during parturition or the puerperal period, not to the latter condition *per se*.

On examination with the Sims speculum we see how easily and freely the uterus moves with every respiration. This mobility is chiefly necessary because the uterus is situated between the the bladder and rectum, and these organs undergo considerable changes in size and position. Furthermore, the uterus requires very yielding but, at the same time, elastic and contractile supports during cohabitation, pregnancy, parturition, and puerperal involution. The normal movement of the uterus occurs mainly around a transverse axis passing through the isthmus. Indeed, the greatest mobility in the uterine tissue itself is present in the region of the internal os. Hence this part is to be regarded as the relatively fixed point in the normal movements of the organ. Even under normal conditions the corpus uteri is pushed upward and backward

with increasing fulness of the organ; with still greater fulness the entire organ is pushed backward and upward. If large fecal masses accumulate in the rectum, the cervix is pushed forward. In morbid conditions I have repeatedly found this normal mobility diminished or abolished, inasmuch as the uterus or its appendages are drawn together firmly by previous disease, or the surrounding parts are enlarged or rigid, or finally the elasticity of the supports is diminished or abolished. Everything which produces pressure or traction, especially if this occurs in an unguarded moment, will then give rise to pain or discomfort, while the uterine movements due to filling or evacuation of the bladder or rectum may be free from pain.

Hence it is evident that the normal uterine supports must be loose and easily yielding but very elastic. The scientific interpretation of these conditions I must leave to specialists, but I will here give in brief my own interpretations.

As a general thing, it is found that the vagina is thrown so much more into transverse folds, the more vigorous it is. This alone would lead us to believe that it does not support the uterus from below like a spiral spring, but that it prevents the upward displacement of the organ by an elastic traction downward and forward.

The uterus may be compared to an inverted ninepin, which is slightly fixed at its lower third by yielding elastic ligaments, and the vagina may be compared with an elastic cylinder which, surrounding the tip of the ninepin, draws downward (and forward). If this cylinder is made tense, a certain influence may be exerted upon the position of the upper, thicker end of the ninepin; its relaxation will permit the position of the upper extremity to be influenced in greater measure by other forces. As a matter of course, the vagina can only exercise this traction when the supporting parts proper are normal.

The combined upward traction of the ligaments draws the uterus slowly upward into its original position when, for example, it has been draw down to the introitus by means of forceps and then released. In high lifting of the uterus, on the other hand, the exploring finger is firmly grasped by the vagina, and even the external genitalia may be drawn inward. If, moreover, we remember the violence with which the uterus is carried downward should the organ be released suddenly after this lifting, this is, in my opinion, a proof that the activ-

ity of the vagina consists in contraction in a longitudinal direction, *i.e.*, downward.

After removal of the intestines from a female cadaver, the uterus appears to be swinging between the broad ligaments. On the posterior surface, as far as the cervix, the uterus is covered with peritoneum which passes into these ligaments. At the isthmus they appear to be most rigid.

In falling of the womb subjective symptoms appear which point more or less to a pathological traction on the peritoneum; for example, a feeling of heaviness and pressure downward toward the vulva, wandering sensations in the epigastric region, loins, or sacrum, etc. Such falling, with or without deviation of the uterus, is often seen as the result of increased pressure from above upon the pelvic peritoneum, as, for example, in lifting heavy objects.

All these circumstances have led me to believe that the uterus is really carried by the peritoneum, although assisted by the other surrounding ligaments. The floor of the pelvis also plays a prominent part, because it furnishes a vigorous support from below; its muscles must occasionally be brought into action against forces which press from above. In addition, the uterus receives a certain support from the bladder and is fastened by bands of tissue, on the one side to the pubis and bladder, on the other side to the sacrum. But all these parts must not alone support the uterus in the ordinary position of the body, but they must also retain the organ in anteversion during bodily exertions, during the action of the abdominal muscles, of micturition and defecation, etc. For this reason they must possess a certain degree of contractility. Notable muscular bundles are found only in the round ligaments, in the others merely scattered muscular fibres, so that the possibility of efficient contraction of the latter has been denied. But I ask, How can we then explain the fact that a prolapsed uterus, or one which has been displaced backward or to the side, can be brought permanently into the normal position, unless the relaxed supports are able to contract? Moreover, after stretching the firmly retracted posterior ligaments, I have distinctly felt them contract spasmodically.

These ligaments hold the lower part of the uterus back, the round ligaments fix the fundus anteriorly.

But the normal position depends not alone on the strength

of these supports, but also on the harmonious action of a number of elastic parts, such as the peritoneum, abdominal muscles, diaphragm, muscles of the chest and back. When the abdominal walls are relaxed for any reason, whether from direct relaxation of the peritoneum passing from the abdomen into the pelvis or of the abdominal muscles, or indirectly from yielding of those muscles which keep the chest and head erect, this will effect a downward pressure of the supports of the uterus, in the same way as this is seen through Sims' speculum in connection with the respiratory movements.

CHAPTER XIII.

UTERINE DISPLACEMENTS.

In examination we should endeavor, as far as possible, to discover the relaxation which may be present. For example, the supporting finger pushes the uterus into the approximately normal position and is then slowly withdrawn; the uterus will then follow to a greater or less extent, inasmuch as the less firm supports yield. When the uterus lies to one side, the disturbances and pains may appear on one side; when the organ is drawn to the side or fixed there more firmly by inflammations or cicatricial retraction, the pains develop on the side toward which the uterus is drawn. But if, on the other hand, pains are found only upon the other side of the body, there is reason to suspect that the disease is due to morbid yielding on this side. This will be confirmed by the fact that, if we carefully attempt to stretch the retracted parts on the other side, they readily yield and at once feel normal.

This stretching is not in the least painful, and is not attended, as in the first case, with rigid tension of circumscribed broader or narrower retraction bands. In the first case the stretching is much more difficult, often painful, and requires longer time; it is sometimes even impossible for a time. Immediately after complete stretching the retraction bands may disappear entirely, but a tender infiltration is sometimes found in their stead.

In posterior uterine displacements, when the cervix is very short, it is often difficult or even impossible to push backward, to any considerable extent, the portio vaginalis, which is situated close to the urethra. In the majority of these cases, however, we find that after reduction of the corpus uteri anteriorly the cervix can be carried back without special resistance; relaxation is then present, in the main. In other cases the cervix remains fixed anteriorly, even after reduction of the corpus, and this is usually due, without doubt, to processes of retraction.

The normal position of the uterus is necessary to its complete normal activity. Its vitality is manifested in the activity of its vessels and nerves. Hence the latter must be normal and must be able to exercise their activity unimpeded. As the uterine vessels and nerves pass to the organ through the surrounding parts and chiefly through the broad ligaments, the normal or changed condition of these parts is important. In displacements changes, such as retractions, elongations, and relaxations or twistings, sometimes congestions or even exudations, are present, and impair not alone the vascular and nervous activity of these parts, but also those of the uterus.

How can all this be improved materially by forcing the uterus into a more or less normal position by means of a pessary? Or does any one believe that a paralyzed arm will become normal from placing it in a bandage? Are exudations or congestions in the ligaments cured by these instruments?

It is also to be assumed that electricity is useless, inasmuch as this method has not met with general approval. Nor can operations be resorted to in such cases.

It cannot be denied that a certain number of patients who are treated with pessaries are cured, but I believe that this result is due chiefly to the fact that, prior to the oft-repeated introduction of the instrument, the uterus is first reduced and that the vessels and nerves are then stimulated. I have often obtained the same results without an instrument, even after the first treatment, and I therefore deny that the supporting action of the instrument is an essential feature. I also believe that the constant pressure of the pessary interferes with the vitalization of the vessels and nerves.

In my opinion the only rational treatment consists in relieving retractions, congestion, exudations, etc., by means of massage, stretching or pressure movements, and, on the other hand, in attempting to stimulate the paralyzed and elongated ligaments to contraction by means of lifting movements. As a matter of course, this can only be attained when the nervous energy has not suffered too seriously.

In addition I attempt to reduce the uterus as soon and as often as possible. As a matter of course, my object is the permanent restoration of the normal position. Even if this does not succeed, the constant reductions will facilitate the vascu-

lar and nervous activity, and thus further the success of other treatment.

Bladder symptoms may be due to posterior displacement, to the falling or increased volume of the anteverted uterus, or to prolapsus. They may also result from posterior uterine adhesions with traction on the bladder. They are then relieved during the course of treatment by the improvement in the exciting cause. If the posterior fixations are removed, the bladder symptoms usually disappear as soon as the uterus is reduced, even if it does not remain in the normal position. If the reductions are performed carelessly, the bladder symptoms are directly increased. The entire uterus should first be drawn downward and forward, and then tipped forward carefully without giving rise to pain. If the symptoms are due to an affection of the bladder or are very severe, they must first be relieved or improved before reduction or lifting of the uterus can come into question.

On the other hand, it is by no means rare that, as soon as the previously retroverted or prolapsed uterus begins to remain in the normal position, bladder symptoms make their appearance for a day or two.

In many cases derivative treatment is indispensable in displacements. In the first place it is always necessary when inflammatory conditions have caused or complicate the abnormal position; secondly, it is sometimes necessary symptomatically, in order to improve a dysmenorrhœa, menorrhagia, or metrorrhagia. Patients who suffer from firm fixations, etc., often complain that their pains are considerably increased at the menstrual period. Then the derivative movements cannot be dispensed with, although it is best to supplement them with massage and lifting movements whenever the latter are possible. If practicable, this action is still further increased by hydropathic treatment, although not during the menses.

In several cases in which the uterus was drawn firmly forward, backward, or laterally, I have found that the menses were not alone prolonged and more profuse, but that a bloody discharge was also present during the intervals. The symptoms subsided in proportion as the organ was made more movable, derivative movements always being employed in addition.

The question also arises whether an uterine displacement *per se* requires treatment. A vigorous woman, who could ride at a gallop without inconvenience, permitted one of my young female pupils to examine her in order that the former might have an opportunity of observing healthy genitalia. The uterus was found in a transverse position, the fundus being drawn to one side, the portio vaginalis to the other side of the pelvis. In similar cases I have also found pronounced retroversions. In such cases we should only attempt to change the condition if the woman is sterile and is anxious for children.

Although strong fixations may be present, in exceptional instances, without any symptoms, they should be relieved because they may give rise to abortion in case of pregnancy.

In a large number of cases in which it was impossible to vitalize the relaxed parts so that the previously retroflexed uterus lay permanently forward, the symptoms at least have disappeared under my treatment, so that the patients were not alone restored to health, but were again able to work.

Hence, it is the main object of treatment to relieve the symptoms; secondarily, we attempt to restore the normal position because the displacement is sometimes related closely to the symptoms or their causes, sometimes it predisposes to relapses of the symptoms.

Although I often obtained remarkably rapid results in prolapsus and other displacements, it was usually more or less difficult, sometimes even impossible, to bring the uterus permanently into a normal position. The treatment is apt to be especially difficult and protracted when the abnormal position resulted from more or less extensive relaxation.

In other cases in which the uterus was tolerably fixed in the abnormal position or, when the displacement is due to fixations, all the supports are felt to be elastic to a certain extent, the restoration of the normal position was very easy, sometimes so easy that the uterus did not leave this position after one or a few sittings.

In some cases the prognosis is difficult. As a rule, we are unable to foretell the period of recovery, not even whether recovery will be obtained. But as I have secured a permanent normal position in hundreds of cases, even in a case of

posterior displacement with total rupture of the perineum, I continue the treatment for a long time in difficult cases.

In one very vigorous patient it has happened twice, at an interval of six months, that the patient could be relieved of the pains only after reduction. On both occasions she had acquired the disease accidentally from lifting a heavy load. The fundus was found displaced posteriorly and deeply to the left. In order to ascertain whether it was fixed in that locality, I attempted, with my finger in the vagina, to push it gently away from the pelvic wall toward the median side. Then the uterus suddenly passed into the normal position, as if moved by a spring, and all the symptoms had disappeared. It is noticeable fact that this patient was treated soon after the development of the disease.

CHAPTER XIV.

RIGID UTERINE DISPLACEMENTS.

WHENEVER the uterus is drawn more or less firmly toward the pelvic wall or its physiological mobility is merely impeded, the shortened parts must be stretched until the natural elastic and muscular connections of the uterus can act without hindrance. The relaxation due to cautious stretching will be gradually counterbalanced, in part, by nature's efforts, but during this time the previously relaxed supports may shorten and become more powerful so that finally the normal position is maintained. In order to exert a vitalizing influence on these relaxed parts, uterine liftings must be performed as soon as true fixations are no longer present. In retroversions the uterus must be reduced daily as soon as it has become sufficiently movable.

If exudations or great tenderness indicate a decided inflammatory condition, the stretchings, and still more the liftings and attempts at reduction, must be suspended temporarily until the inflammatory symptoms have been sufficiently relieved by massage and derivative movements. So long as inflammatory conditions are still present in the uterine supports, I employ, immediately after the local treatment, pressing together of the knees with elevation of the sacrum.

The stretchings must be performed cautiously but not too feebly or briefly. In the latter event an irritation alone is produced; this causes contraction of the parts instead of relaxation.

The danger of producing exudations in the ligaments, etc., is more threatening than in any other manipulation, if the stretching is in the slightest degree too forcible. Hence, it is a rule to do too little rather than too much, because we always have the opportunity, on the following day, of gaining more ground.

The force to be employed varies greatly in different cases.

We must attempt to determine it experimentally, guided by an accurate exploration and previous experience.

The elasticity and degree of yielding of the parts which are to be stretched vary greatly, because they are sometimes very thin and soft, sometimes considerably thickened, firm, and rigid. In the softer retractions our object can usually be attained in one sitting or, at the most, in a few sittings. In very strong fixations we must sometimes continue the stretching, with a good deal of force, for a quarter of an hour or more, and perhaps repeat the manipulation daily for two or more weeks, before they begin to yield.

In difficult cases I follow a certain routine. At first I inform myself, by careful exploration, concerning the position, direction, strength, etc., of the fixation, and apply to it massage in as centripetal a direction as possible. Then the patient is placed in the position most suitable for the case, the parts are grasped in a definite manner and gradually stretched to the utmost, so far as their yielding character permits but not farther. This tension is maintained for a while, then relaxed a little for a short time, and repeated one or two times in this way. After each stretching, circular rubbings are made around and above the stretched parts. According to circumstances the index finger is introduced into the rectum or vagina; in some cases the thumb is inserted per vaginam, or this is combined with the index finger in the rectum.

We must sometimes ask the sufferer not to be too patient; it is best to watch her face closely in order that we may relax at once if there is a sudden manifestation of pain. The stretching should be as painless as possible. If the fixation is very extensive, as is especially true of superficial adhesions, we first stretch more vigorously at one part of the circumference, then at another, until we have passed around the entire adhesion.

The stretching force must always be applied from the point of adhesion to the pelvic wall and as perpendicularly to the latter as possible. But when the fixation has been made movable and elongated to a certain extent, we may attempt to stretch it in a more partial manner. It is grasped bimanually at the uterine extremity, then stretched more obliquely in one direction, and carried slowly around in a circle, thus stretching it from all sides.

The stretching may be done in the erect, half-reclining, or abdominal position. If the patient is very obese and has large thighs, stretching in the erect position is greatly facilitated by placing the farther foot upon a chair.

In some cases the uterus lay against the pelvic walls as if firmly adherent, but it was made thoroughly movable after a little while by means of stretching and massage. In other cases several weeks or months are requisite, especially if we must exercise great caution on account of previous severe inflammations.

In such cases we can usually feel distinctly, during the manipulation, when the stretching is beginning to be successful. I then discontinue the stretching at once. At the next sitting what has already been stretched yields immediately, and I then cautiously stretch a little farther. Sometimes feebler traction will succeed during menstruation, although vigorous manipulations were useless in the intervals.

But despite the greatest caution, it has happened in a few cases that excessive force was employed in detaching firm adhesions, and that inflammation resulted. In such cases violent pains in the pelvis, often associated with chill and fever, develop at once or at least within the first half-hour. In every case of this kind in which an examination was made, a very sensitive swelling, up to the size of a hen's egg, was found in the stretched part within fifteen minutes. When such symptoms set in, I keep the patient at home for one or more days and apply massage to the exudation as soon as possible. At first I repeat the massage two or three times a day, and do not begin again with the stretchings until the tenderness and swelling have disappeared. This sometimes takes place very rapidly. For example, exudations as large as a hen's egg may disappear after three days' treatment at home, so that on the fourth day general treatment can be recommenced. Formerly I often employed frequently repeated cold compresses, but more recently the ice-bag has been found to do better service. The massage may be continued during menstruation, but the cold applications should be omitted.

Although the symptoms appeared to be very threatening in some cases, none of my patients has died nor has the condition been permanently aggravated.

In anteversions the stretchings from the front are some-

times necessary; for example, when the fundus is very firmly drawn close to the pubis. In one patient, who suffered from chronic metritis with sclerosis and enormous enlargement of the uterus, the fundus was fixed so firmly against the pubis that I only succeeded in detaching it after the lapse of a month. In another case the fundus was drawn obliquely forward, upward, and to the right against the abdominal walls. The patient was treated two months before the uterus could be detached, and then, despite the greatest care, inflammation again developed in the uterus and ovaries.

When the fundus is firmly adherent against the pubis, while the portio vaginalis is approximately in the normal position, I have adopted the following plan: The lower part of the uterus is first drawn close to the pubis by means of the index finger (per vaginam), which is hooked around the isthmus. Then I pass the finger along the posterior surface of the body of the uterus, at the same time pressing the entire uterus straight, and then push it carefully upward along the pubis, so that the fundus is above the latter. If the right elbow is now held high so that the forearm and hand form a straight line, we will be able, by means of the palm of the hand (which is turned toward the abdomen) to press back the fundus from the front with sufficient power. This succeeds better and better every day. At the same time we attempt to push the tips of the fingers down along the anterior surface of the uterus. When this has succeeded, the supporting finger is carried to the anterior surface of the cervix and attempts to complete the separation by pushing the isthmus alternately downward and upward with this finger and the fingers of the external hand, careful pressure backward being made at the same time.

With a skilful assistant our object may be attained more rapidly. While we apply the index finger in front of the cervix in the ordinary way, the assistant carefully pushes her hands down between the fundus and the pubis (as in the preparation for ordinary lifting of the uterus), withdraws her hands in the same direction, and repeats this a few times. It is only after the fundus has been pushed well back that more and more complete liftings may be gradually carried out.

If the fixation between the fundus and pubis is very firm, it is best to push the former alternately to the right and left

sides, while the patient is in the half-reclining position. Or, while the patient is in the erect position, the thumb may be applied per vaginam to the anterior surface of the isthmus, and alternating pressure made on different sides. The bladder should be spared as much as possible. One or two months are often required in order to detach the uterus in such cases.

The portio vaginalis or the entire cervix is not infrequently drawn more or less firmly against the pubis; as a general thing, the fundus is then retroverted and movable. These women are often sterile, and sometimes sexual intercourse is painful. The portio vaginalis is sometimes close behind the urethral opening. As a rule the symptoms are relieved as soon as the uterus is restored to the normal position, sometimes even before the posterior displacement is relieved if only the cervix has been made movable. In these cases it is impossible to push the portio vaginalis directly backward in order to secure stretching. This is also often impossible in simple retroversion without adhesion anteriorly. But if the retroverted or retroflexed corpus is pushed forward by means of the index finger per rectum, and the thumb is applied high up on the cervix, the latter can easily be pushed back and the adhesion stretched with the thumb. This is done most readily when the patient is in a standing position. If the elbow is supported on the corresponding knee, we not alone gain more power, but can also gauge the force accurately. If the cervix slides upward so that the thumb slips past it backward, the corpus uteri is held forward with the index finger while the stretching is performed with the thumb. Or the patient assumes the abdominal position, the free hand is placed flat on the hypogastrium, the fingers enter behind the pubis, and the cervix is pressed backward with the thumb per vaginam and the free hand through the abdominal walls. When the abdominal walls are very flabby, this may sometimes be done while the patient is standing, turned toward the seated physician, and bent over him; then the dorsal surface of the free hand must be turned toward the abdominal walls.

In all cases in which the upper part of the uterus is movable, but the cervix is adherent, the normal position can never be secured before this obstacle is removed.

There are a number of cases in which the uterus, whether retroverted or anteverted, is adherent to one side of the pelvis,

sometimes along its entire length. If the fundus is adherent to the side and posteriorly, and the cervix is adherent to the side and anteriorly, the separation is sometimes attended with a certain degree of difficulty. I then attempt first to make the cervix more movable. With the patient in the erect position the thumb is pushed per vaginam as far as possible between the cervix and the pelvic wall, and then the same finger pushes the cervix against the pelvic wall and displaces it backward. In order to secure endurance without becoming tired, I support the corresponding elbow on the knee, so that the stretching movement of the thumb can be effected by rising on the toes. I then introduce the index finger into the rectum as high as possible along the posterior surface of the corpus uteri, and attempt to stretch the adhesion from above, pushing the fundus partly forward, partly away from the pelvic wall. Then, with the patient in the half-reclining position, the external hand pushes deeply along the lateral wall of the pelvis so that the tips of the fingers penetrate between the pelvic wall and the uterus, and then assist the internal fingers in pushing the organ toward the median line. This is repeated daily, and, after it has succeeded in a measure, reduction of the uterus is attempted. We first reduce the uterus as much as possible while the patient is in the erect position; then let her assume, very carefully, the half-reclining position in order to complete the reduction, if necessary, after massage of the obstructing bands. After reduction, the rigid parts are masséed. Later oblique liftings of the uterus are attempted, but not before the fundus has been carried across the median line into the other side of the pelvis.

The cervix or fundus is very often found adherent posteriorly, usually obliquely to the side. If the uterus is large or lies deep in the concavity of the sacrum, the shortened ligaments are stretched in the standing position, if necessary in the abdominal position, by means of the index finger per rectum, its tip being carried above the isthmus of the rectum and the tense adhesions. As soon as the fundus is pushed forward to such an extent that the uterus lies about in the vertical median line of the body, we begin to attempt its reduction. For this purpose the thumb is applied per vaginam to the anterior surface of the cervix, and this is pressed backward, in order to antevert the uterus during the stretching. It is only

later, after reduction succeeds without difficulty, that uterine lifting may be employed.

In marked anteflexions, the uterus as a whole is quite often drawn very firmly backward or backward and sideward, apparently by the posterior ligaments, while the portio vaginalis and fundus can be easily moved toward both sides. In many cases in which I succeeded in stretching the ligaments so that the uterus returned to its normal position and the symptoms disappeared, I found subsequently that the retraction had again occurred, either with or without symptoms.

In some cases the retroverted uterus was so firmly drawn against the posterior part of the pelvis that, after unsuccessful attempts for two weeks, I was inclined to assume an adhesion. But I gradually succeeded, in the following manner, in stretching the retracted parts in such a way that I could carry the fundus forward and downward to the pubis: With the patient in the erect position I carried the index finger per rectum along the sacrum, past the isthmus of the rectum, and then made stretchings, perpendicularly to the pelvic wall, on both sides of the fixation. The thumb, per vaginam, was then placed forthwith on the anterior surface of the uterus (upon the cervix when the uterus is small and rigid, upon the lower half when the uterus is large) and pressed alternately with the index finger, at first backward, then vigorously upward. By daily repetition of the manipulation the fundus is forced farther and farther forward.

A number of my patients suffered from obstinate constipation which had lasted for years. Several, who complained of a mechanical obstruction during defecation, had been treated by forced dilatation, without the slightest benefit. On rectal examination of these cases I found that the uterus was drawn high up and backward. Hence there was an abnormal retraction of the ligaments. Soon after treatment the bowels became normal, because the position of the uterus approached the normal and the ligaments became more yielding.

In a few of these cases only the sacro-uterine ligaments were shortened and the uterus was anteflexed in the above-mentioned manner; in others the uterus was displaced backward and the fundus fixed posteriorly on both sides; in the most severe cases the posterior surface of the uterus was firmly adherent to the rectum.

In such cases the ordinary gymnastic movements which stimulate the action of the bowels are made, but the main feature is the cautious and persistent stretching of the ligaments and adhesions, done in the erect position, from above forward and downward, by means of the index finger carried through the isthmus of the rectum. The tip of the finger must sometimes reach above the corpus uteri and the broad ligaments, even above the fundus, in order to be able to press downward. The uterus is often tender, and the pressure must then be applied alongside the organ. The pressure should be applied uniformly over the shortened ligaments.

After I had treated a large number of pelvic diseases for years and found that so-called fixations always could be stretched, I began to regard all these affections as retractions which merely required caution in stretching. At a later period I found that real adhesions occurred, and in individual cases the differentiation is very difficult. In many cases in which, for a time, the uterus appeared to be adherent to the pelvic walls, I succeeded finally in detaching it, and a few cases may be reported in order to show that hope should not be abandoned.

Mrs. C. A., æt. 35 years; the body of the uterus was found fixed so firmly against the sacrum (a little to the right side) that on the first day it seemed to me impossible to detach it. But on the second day the uterus became slightly movable and on the third day the corpus could be drawn about half way to the normal position. On the fourth day the uterus was completely reduced, and remained in the normal position while under observation.

Mrs. B., æt. 24 years, had remained in bed for a year, at the advice of her physician, on account of a pelvic inflammation with exudation and supposed adhesion. On examination the uterus was found retroverted and drawn firmly toward the right side. On the following day I allowed the patient to rise, and after three weeks' treatment she was able to come to my office. Although I treated this patient repeatedly for a protracted period, I did not succeed, during the first year, in making the uterus movable. In the following year the patient returned. Then the firm fixations were soon stretched and the uterus was restored to its normal position, but it could not be kept in this position.

In a young married woman who suffered from pains in the back and abdomen, I found the uterus drawn up so high that the index finger could only reach the portio vaginalis, and I could not determine where or how it was adherent. I made three attempts at lifting the uterus, and the organ became perfectly movable.

Adhesion to the Rectum.—The retroverted uterus sometimes adheres to the rectum over a greater or lesser area. In certain cases this seems to interfere with the peristaltic activity of the rectum, inasmuch as the patients suffer from constipation and the ampulla recti is often empty, while the upper part of the rectum is found to be full. It is characteristic that the uterus may be nearly or entirely reduced, but only remains reduced so long as it is held in this position; as soon as we let go, it is drawn back by an elastic traction.

This quasi-reduction may be performed ventro-recto-vaginal, employing the manipulation with the thumb which has been mentioned above. If the adhesion does not extend up to the fundus, the latter may be grasped in the ordinary way and carried forward and downward. When the free hand passes backward along the posterior surface of the uterus, we can feel, at the beginning of the adhesion, a certain resistance to the deeper entrance of the fingers; this resistance increases as the fundus is pushed forward, and grows less as this pressure diminishes. In order to push down with the fingers so that they may meet the index finger in the rectum, the tips of the fingers must be placed a little behind the uterus, while the fundus is drawn forcibly forward, and the fingers are pressed in deeply while the forward pressure of the fundus is somewhat discontinued. The previously tense rectal wall is now folded inward, and with this hand we can palpate the entire posterior surface of the uterus and the adherent rectal wall.

But if the adhesion extends to the fundus, the latter cannot be grasped in the ordinary way. We then attempt to push it forward as far as possible by means of the previously mentioned thumb manipulation, and apply the finger tips of the outer hand a little above the fundus. We may now succeed in infolding the somewhat tense rectal wall in such a way that the finger tips may reach the posterior surface of the corpus, and then draw the latter forward and downward.

If we now hold the entire uterus as far forward as possible

(the cervix with the middle phalanx of the index finger, the fundus with the middle or upper parts of the fingers) we can palpate laterally—below with the tip of the index finger, above with the tips of the free fingers—and can feel the tension of the lateral walls of the rectum and of any fixation bands. As soon as we let go, the uterus springs back; this is very characteristic.

In order to detach the rectum from the uterus, we may proceed in the following manner: With the patient in the half-reclining position the uterus is pushed as far forward as possible by the ventro-recto-vaginal method, already described. We grasp a little above the fundus, in order to be able to infold the wall of the rectum as far as the posterior surface of the corpus uteri. The cervix is firmly fixed upward and backward by the two internal fingers in such a way that, grasping the recto-vaginal wall between them, they cross one another, (the tip of the thumb on the right, that of the index finger on the left) and the portio vaginalis is situated in the angle formed between them, as in a figure-of-8 pessary. We now attempt, with the tips of the external fingers directed backward, to draw the duplicated external wall downward, by means of repeated short stroking movements, directed backward and downward, and which are made close to the fundus or to the upper border of the adhesion which is situated somewhat lower. During this time the fundus is constantly drawn forward, but not the slightest violence may be employed.

This constitutes, at the same time, massage and stretching of the fixation. The manipulation is very wearing; hence rests must be taken, during which, however, the uterus is held firmly. It is best to hold the elbow straight upward, so that the fingers, hand, and forearm form a straight line.

It is only in comparatively few cases that the detachment is complete, so that the uterus remains in the normal position. Sometimes only the upper or lateral part of the adhesion is separated, and then the uterus is constantly drawn backward as soon as the fingers let go. Sometimes we cannot succeed at all in separating the adherent organs, but the symptoms may be improved by the stretchings and massage.

CHAPTER XV.

RELAXED DISPLACEMENTS.

As it is often very difficult, sometimes even impossible, to cure relaxed displacements, we should endeavor, as far as possible, to prevent their development. They seem to me to be due to improper or careless measures employed during parturition or child-bed. In the majority of cases of relaxed retroversion the patients informed me that they not alone had remained in bed nine days or more after confinement, but that they had preserved dorsal decubitus during this entire period.

During the first week of the puerperal period the uterus is so large that its weight acts more strongly upon its supports. It may be that it has rarely grown so small before the ninth day that the fundus can fall backward past the promontory, but the ligaments are prevented from regaining their normal elasticity at a sufficiently early period, especially if the patient is feeble. There is no doubt that rest is necessary after delivery, but it is best attained if the woman lies upon her back, the right or left side, as she pleases.

A not infrequent cause of uterine displacements is the habit of retaining the urine too long.

If a general or partial relaxation of the uterine supports has developed, is it possible again to vitalize and strengthen them? My large experience seems to demonstrate this completely, but I am unable to explain why it does not succeed in some cases and very readily in others. The age and strength of the patient seem to possess great importance. If senile changes have developed, the prognosis, as a rule, is unfavorable. Displacements of long standing require longer treatment, but the difficulty in treatment does not depend directly on the duration of the disease.

In regard to prolapse, we may assert that a favorable prognosis attaches only to those cases in which the uterus begins to remain within the body after one or two weeks' treatment.

Other cases are either not cured at all or only incompletely and after protracted treatment.

The variable results in the treatment of relaxed displacements probably depends upon whether nervous activity is still present or is more or less paralyzed.

When the uterus begins to retain an improved position between the sittings, we must, as a matter of course, avoid everything that might disturb this position. Otherwise the old condition will develop at once. For example, violent straining must be avoided, the urine should not be retained too long, and the patient must not lift heavy loads, walk a long distance, ascend flights of stairs, etc.

I have found on several occasions that although the uterus had remained anteverted for several days, it again became displaced when accidentally thrown backward during a remedial gymnastic movement. This may take place, for example, when lifting is performed improperly or carelessly, in the various abdominal movements, rotation of the thighs, swinging the knee up, etc.

The main movement in the treatment of flaccid changes in the supports and associated displacements is lifting of the uterus, which must be performed in different ways according to circumstances. The guiding principle is to cause contraction of the relaxed parts by means of short and not too vigorous stretching, aided by vibratory movement, and at the same time to stretch the parts which are too short or too rigid, so that they cannot again undergo complete shortening, at least not at once. In this way we influence not alone the vaginal walls, but also the upper uterine ligaments and the peritoneum.

In order to increase the innervation of the relaxed supports, sacral percussion is performed, a different position being given to the body according to the condition of the pelvic organs in other respects. I also attempt to stimulate the innervation of the supports by fine but decided pressures on the sympathetic nerve plexuses on both sides of the promontory. When the posterior ligaments are relaxed, I perform a few vibratory pressures at and around their point of insertion into the posterior pelvic wall. In relaxation of the vagina, pressures on the pudendal nerve are sometimes added.

If the floor of the pelvis is relaxed, I attempt to invigorate it by separation of the knees with elevation of the sacrum,

and sometimes by a movement which the patient herself performs at home three to five times a day. Either standing supported or lying on her back she crosses one leg over the other; while keeping the thighs strongly in apposition, she attempts to retract the pelvic floor vigorously, in the same way that the stool is retained when there is a strong desire to defecate. This movement is repeated three or four times.

In retroversions or prolapses the patient may not rise from the dorsal position in the ordinary way, because this may destroy the desired action of the treatment on the supports. She may be assisted in various ways. While she keeps the back and neck stiff, we place one hand upon the back of her neck, the other between her shoulders and thus draw her into a sitting position, or she supports herself upon her arms, which are placed on the bed behind her, and raises herself with their aid. It is still better to turn carefully into the abdominal position and then, with the aid of the arms, to pass into the kneeling position.

Lately I help the patient up, immediately after the local treatment, in the following way: I pass the index finger into the vagina high up on the anterior surface of the cervix, then grasp, with my free hand, both hands of the patient, while the latter places the foot nearest to me upon the floor, and I then draw the patient up. After she is standing, I press the cervix firmly backward and upward for a while and then withdraw the hand.

As a matter of course, if other morbid conditions are present, many other movements may become necessary.

At the present time the following is the ordinary series of local movements:

1. Dorsal hacking and percussion of the loins and back.
2. Reduction, stretching, massage, etc., as required.
3. Lifting of the uterus.
4. Sometimes repetition of massage, as, for example, at the point of flexion in cases of retroflexion.
5. Hypogastric or pudendal compression, when necessary.
6. Separation of the knees with elevation of the sacrum; if necessary, pressing the knees together.
7. Sitting bent over—alternate rotation (in prolapse).
8. Assisting the patient to rise and pressing the cervix up-

ward; then mild percussion of the loins and back, often followed by abdominal decubitus.

A. Posterior Displacements.

Relaxed posterior displacements may have developed originally as such, sometimes from accident, as lifting a heavy load, excessive abdominal strain, protracted retention of the urine. In other cases they may develop rapidly during the puerperal period, or slowly in debilitating diseases such as chlorosis, etc. Relaxed posterior displacements may also be left over after separating abnormal uterine adhesions or, as happens not infrequently, when in prolapse the treatment is successful only to such an extent that the uterus remains within the body.

Here the short liftings are especially effective. When, prior to the daily treatment, the uterus is found anteverted for the first time, a good deal has been gained, but renewed caution is then necessary; in the first place, that the organ is not accidentally thrown over backward; on the other hand, that the supports are not stretched more than is necessary to give rise to a stimulus to contraction.

B. Lateral Displacements.

Here stretching is first performed, if necessary, until the uterus can be carried at least to the median line of the body. The liftings are performed obliquely, one hand strongly stretching the more rigid parts, the other attempting to stimulate the relaxed parts by vibratory tremor. After local treatment and after the patient has been helped into the erect position, the cervix is pushed obliquely upward, in order that the previously relaxed supports may shorten. Sacral percussion is performed only once on the side of the more rigid supports, and three to four times on the side of the relaxed supports.

C. Prolapsus Uteri.

The uterus must be restored to its normal position before the special movements are performed.

The special treatment consists of the following movements:

1. Supported standing—percussion of loins and back (p. 96).

2. Half-reclining—lifting of the uterus (first form) with hypogastric compression and, if necessary, pudendal compression.

3. Half-reclining—separation of the knees, with elevation of the sacrum (p. 94).

4. Sitting bent—alternate rotation (p. 74).

Every morning and evening the patients take a vaginal injection of about one-quarter of a litre of not too cold water. The previously mentioned retractions of the floor of the pelvis should not be omitted.

As soon as the uterus begins to remain within the body and is thus relieved from the pressure of the vaginal opening, which has contributed to its enlargement, it will be found that the size of the organ gradually diminishes. In older prolapses in which the mucous membrane of the vagina and portio vaginalis is often dry and rigid, it soon softens and gradually returns to the normal condition.

In a few old cases in which pessaries had been worn many years and the treatment appeared ineffectual for several months, the relaxed parts began to be vitalized when I added to the other movements, "malen" along the internal pelvic walls and strokings on both sides of the promontory.

The uterus often remains in the body after the first sitting, in other cases not until after a period of one or two weeks; then the fundus is usually displaced backward or to one side. During the course of treatment the movements must be changed with the change in the position of the uterus, but, so long as the organ continues to protrude, the above-mentioned treatment is repeated once or twice a day. When it begins to remain in the pelvis, the liftings are not performed so high, in order that the parts which are stimulated to contraction should not be overstretched. When only a posterior displacement remains, the case is treated as such. It is always difficult to determine the correct form of lifting in an individual case.

Professor von Preuschen and others have claimed that separation of the knees, with elevation of the sacrum, was the chief, if not sole, efficient factor in my treatment of prolapse. But prior to the year 1877, in which I first employed this ma-

nipulation, I had cured about forty cases by means of sacral percussion and liftings.

It is my opinion that in healthy women in whom the fornix is so freely movable, a pressure from above is first antagonized by the upper supports; when the pressure is still more vigorous, the floor of the pelvis comes into action in order to prevent the downward pressure of the uterus; when the pressure is too strong or both supports are too weak, the uterus sinks, and may even prolapse entirely. Hence the floor of the pelvis must be regarded as a sort of reserve support.

But I do not believe that prolapses can be cured by strengthening the floor of the pelvis, whether by exercise or operation, unless the superior uterine supports are vitalized.

In incomplete prolapses, in which only the elongated, more or less hypertrophic cervix is prolapsed, the treatment mentioned has equally good results. Although the fundus is sometimes as high as in the normal position, on account of the coincident enlargement of the corpus, the isthmus is prolapsed in retroversion of the enlarged body. If the isthmus is then drawn up sufficiently high, the portio vaginalis, as a rule, will be drawn within the introitus vaginæ. The cervix is sometimes extremely long and thin, but the normal shape will return in a short time if it no longer protrudes. In other cases the elongated cervix is very thick and firm. I then employ vigorous massage, but never succeed in effecting complete reduction. When the relaxed walls of the vagina have pulled down the cervix, they must be treated as described in Chapter XI.

D. Falling of the Womb.

As this condition is the beginning of prolapsus, the treatment is the same, although adapted to the individual conditions. For example, sacral percussion is commonly done when the patient is bent over. The liftings are not made so high, *i.e.*, merely in order that the vagina and the relaxed supports around the cervix may be stretched to such an extent that they are stimulated to contraction. If carried too far, the lifting would relax these parts. Separation of the knees, with elevation of the sacrum, is also advantageous in these cases.

CHAPTER XVI.

CHANGES IN THE FORM AND TISSUE OF THE UTERUS.

An extensive experience has taught me that retroversion of the uterus predisposes, not alone to enlargement, but also to elongation. In many cases I regard the enlargement as due to twisting of the broad ligaments and consequent interference with vascular activity; it gradually disappears when the uterus remains in its normal position. The elongation seems to me to be due to mechanical extension; in these cases the elongation develops at once on retroverting the uterus; if it is reduced, it becomes shorter forthwith.

In one case I found that the cervix of the retroverted uterus was elongated, and the lower end had the size and shape of a cherry. After reduction, the cervix always became shorter and normal in shape.

A retroverted uterus is sometimes elongated because the portio vaginalis has been drawn forward by previous retractions. If we succeed in reducing the uterus, it will be found that the organ is, in a sense, pressed together, and that then a certain degree of tension remains between the portio vaginalis and the pubis.

Total or partial enlargements of the uterus as the result of prolapse also gradually disappear more or less completely as soon as the organ begins to remain permanently within the body.

Flexions of the Uterus.

Retroflexions are often attended with severe hemorrhages, which are generally diminished by reduction. Usually the patients do not suffer from the dysmenorrhœal symptoms which are so common in anteflexions. Flexion of the uterus in posterior displacements almost always disappears on reduction, or it passes into a soft anteflexion. In only one case have I found a stiff retroflexion which persisted, even after the uterus was turned forward. As a rule, the same treatment is

employed as in simple retroversions, except that the point of flexion is treated with light, brief massage. Retroflexions are cured with greater difficulty than retroversions, on account of the flaccidity of the point of flexion; hence we must attempt to relieve this as much as possible by mild massage. So long as this has not succeeded, the reduced corpus uteri will again topple backward on the slightest provocation.

When pronounced relaxation at the angle of flexion has made reduction so difficult that it could only be performed by the ventro-recto-vaginal method, a certain rigidity of this part has sometimes been attained by massage, so that later the reduction could easily be performed by the ventro-vaginal method.

In general, I conclude from my experience that, if atrophy has developed at the point of flexion, this may disappear after repeated reductions, massage, and other movements. But if contraction or cicatrices are present, I have had very few good results from treatment.

Rigid bends are sometimes, though rarely, present in anteflexions. In other cases the rigidity is less pronounced or there is even a certain degree of flaccidity; in still other cases the condition has developed from adhesion of the middle portion posteriorly.

In the latter cases our main object is to stretch the shortened ligaments, but it is sometimes also necessary to treat the site of flexion with massage. In difficult cases of this kind the anteflexion persists even though the shortened ligaments have been stretched. If the body of the uterus is then pushed backward, the uterus is found to be straight. Then I have sometimes found, on the following day, that the uterus was still displaced backward, but the fundus directed more or less forward with a flexion in the corpus, and the portio vaginalis, cervix, and lower part of the body in one line. When the fundus is drawn forward, the ordinary anteflexion again develops. Although the reduced uterus is pressed perfectly straight against the supporting finger and the pubis, the anteflexion again appears on letting go. When the fundus is thrown backward, the organ is again straight. It is evident that there must be a certain degree of flaccidity of the uterus. But why does the fundus bend forward? Is it drawn forward by the anterior fasciculi of the broad ligaments?

In reduction of the retroverted uterus, I find that when the organ has reached "half tension" it almost always bends forward as if the supports were pressing together from above and below. Hence I believe that not alone is the slight normal anteflexion due to the action of the upper and anterior supports (broad ligaments, aided more or less by the round ligaments) upon the fundus and the lower supports upon the cervix, but that sometimes the combined action of these supports bends the uterus so that an abnormally pronounced anteflexion results.

In these cases suitable liftings seems to me to be the best mode of treatment. The portio vaginalis is pressed well backward, and the lifting is performed somewhat like a stretching; we lift slowly, maintain the traction for a little while without letting go, then sink the hands; this procedure is repeated three or four times. In addition I massée the point of flexion.

A widow, æt. 40 years, who had given birth to a child fifteen years before, had been treated for many years for severe hemorrhages. The uterus was considerably enlarged and strongly anteflexed, so that the fundus lay close to the portio vaginalis. At each sitting the normal position of the uterus could be secured by careful but difficult work. The patient was treated for nine months, during which the symptoms were relieved, but the shape of the uterus remained unchanged. Two months after the cessation of gymnastic treatment I was again called on account of a violent hemorrhage, and found that the uterus had regained the normal shape and position, although still a little enlarged transversely. She was then treated repeatedly at different intervals. Two and a half years later she remained well.

As a rule, the uterus is small in firm and unyielding, sharp flexions. On February 7th, 1882, a girl, æt. 20 years, came under treatment, suffering from a sharp flexion at the cervix, which could not be straightened. I performed daily lifting of the uterus, the supporting finger fixing the portio vaginalis backward against the sacrum while my assistant grasped the corpus high up and pushed the fundus backward in lifting. In this way the uterus could be extended along the surface of the sacrum. The retroversion induced in this way was main-

tained for several days, while the previously flexed part was masséed daily. When, at a later period, I reduced the corpus anteriorly, I found considerable anteflexion, but the bend in the cervix had disappeared almost entirely. I continued treatment in the same way, and on March 6th the abnormal flexion was relieved.

If we wish to straighten a small, rigidly anteflexed uterus, it is best to manipulate in the following way: The index finger is introduced into the rectum, the thumb into the vagina, and the free fingers are applied to the fundus from the front. While the tip of the internal index finger firmly supports the most convex part from behind, and the portio vaginalis is supported by the thumb from the front, the free hand attempts to press the fundus upward and backward. We can usually succeed in extending the uterus to such an extent that it lies straight and retroverted against the index finger. This is repeated daily until the uterus remains retroverted. After the retroversion has been maintained for four or five days, the body of the uterus is restored anteriorly; if the uterus is found very slightly anteflexed on the following day, it may be allowed to remain. Otherwise it is again brought into retroversion for a time, and the previous manipulation is repeated.

When the obstruction to the escape of blood or other fluids due to sharp flexions gives rise to symptoms, the relief of the flexion may be the main object. We may then be compelled, for a time, to desist from reducing the artificially produced retroversion.

Increased pains during menstruation may develop even in less pronounced anteflexions. If the patient does not suffer excessively, I have seen no reason to produce artificial retroversion. In such cases, if the index finger per vaginam pushes back the portio vaginalis, we can succeed, as a rule, in straightening the uterus, with the free hand, upon the index finger.

Abnormally Large and Small Uterus.

Increased innervation causes increased vascular activity and nutrition. If gentle massage is continued daily, we sometimes find that a very small uterus increases in size with astonishing rapidity. If we employ, in addition, movements which determine to the pelvis, the nutrition of the organs in-

creases still more, and the normal size of the uterus is restored more rapidly.

More vigorous massage will have an opposite effect. If repeated for a considerable time, especially if its action is aided by derivative movements, this effect becomes distinctly visible. In this way absorption is increased. In protracted hemorrhages we sometimes find spongy enlargement of the uterus; the former would be increased if moderately vigorous massage were employed. It is only when milder massage has caused contraction of the uterine substance and has checked the hemorrhage, that we may cautiously increase the vigor and duration of the massage. But if the uterus, during the abnormal hemorrhages, is not alone enlarged but also firmer and harder than normal, we may gradually employ more vigorous and protracted massage, even before the abnormal hemorrhages have ceased.

In patients who have suffered from protracted hemorrhages of many years' standing, the portio vaginalis is usually found swollen and spongy. Not infrequently a pronounced cervical catarrh is also present; the os uteri is usually widely open. The corpus is sometimes enlarged and sclerosed. The enlargement of the portio vaginalis generally disappears rapidly after massage. The corpus may remain hard and large for a long time after the cervix has resumed its normal consistence.

If the uterus is enlarged and menstruation has ceased, derivative treatment may not be employed for fear of possible pregnancy. As a general thing, amenorrhœa is only present when the uterus is small: in morbid enlargement there are almost always increased hemorrhages, and, if these are absent, pregnancy may be suspected.

In a few cases a peculiar condition of the uterus is found. The patients may or may not have borne children. The uterus is very small, particularly the corpus. It feels very soft and sits upon the short, thick cervix like a pointed cap. The portio vaginalis is very hard, almost like a cartilaginous ring around the wide os, through which the finger may be passed into the internal os. If such a uterus is treated by massage, its form and consistence will usually change within a short time. The lower part becomes softer and retracts, the upper part becomes larger than the lower. The entire uterus grad-

ually assumes the normal shape. There is not infrequently pronounced leucorrhœa, sometimes even ulcerations which soon heal in the ordinary way. As a general thing, there were severe hemorrhages, so that derivative treatment was indispensable.

CHAPTER XVII.

INFLAMMATORY CONDITIONS OF THE UTERUS.

Many physicians believe that massage and local manipulations give rise to a hyperæmic condition of the pelvic organs. It is true that clamping and pressure momentarily give rise to obstruction to the circulation, but the after-effect is increased vascular activity and increased discharge of stagnating fluids, *i.e.*, increased absorption.

Not alone are local passive movements effective, but also those which produce increased vascular activity in the outer parts of the trunk and in the limbs. Lifting movements act in the same way upon the uterus, especially when they are combined with clamping and pressure upon the organ. If the portio vaginalis or cervical mucous membrane is affected, I have directed the patient to make a vaginal injection, every morning and evening, of a glass of cool water.

Experience has taught me that, whenever lifting movements are not attended with danger on account on exudations and fixations in the vicinity of the uterus, they always exert a favorable influence on inflammatory processes in the uterus itself.

Many physicians have had the opportunity of observing the success which attends the use of my massage in chronic metritis. It is equally serviceable in hypertrophies and ulcerations.

According as the inflammatory condition is present in the cervix or corpus uteri, the lower part is masséed in the direction from below upward, or the upper part in the direction from above downward. The lymphatics upon and on both sides of the promontory must first be masséed, and the parametria must be masséed in an outward direction in connection with the uterine massage. If the uterus is very firm and not sensitive, the massage may be applied very vigorously. If the organ is very large, the massage may sometimes be ap-

plied exclusively from the outside through the abdominal walls.

As a general thing, the massage must be mild when there is marked sensitiveness, or when it is followed by slight hemorrhages, as occurs occasionally in cervical catarrhs or ulcerations.

Improvement is sometimes very slow and gradual, and occasionally relapses set in after special causes. It seems as if, in individual cases, the patients become more sensitive to colds during the period of treatment.

When there is great enlargement, with hardening of the body and cervix, and metrorrhagia, together with extensive ulcerations of the portio vaginalis, the uterus can sometimes be slowly restored to almost the normal dimensions. As a rule, the ulcerations and hemorrhages are cured with comparative rapidity.

Cervical Catarrh and Ulcerations.

Ulcers result not alone from acrid excretions from the internal membrane of the uterus, but may also spring directly from the parenchyma of the portio vaginalis I do not deny that ulcers may be healed by cauterization or other medical treatment, but as a rule this occurs more rapidly under my method. My treatment merely purposes to aid the curative efforts of nature, inasmuch as I attempt directly and indirectly to increase the absorption of stagnant fluids by means of the movements, which at the same time increase the vitality of the vessels and nerves, locally as well as generally.

Mrs. M. B., æt. 36 years, suffered for some years from vertigo and other nervous symptoms. On examination I found spongy enlargement of the portio vaginalis, the character of which led me to predict the formation of large ulcers. This prediction was verified in a few weeks. A large ulceration formed upon the portio vaginalis, but at the same time the general condition of the patient improved. In my opinion the stagnant fluids in the uterus gave rise to this morbid condition and produced the symptoms mentioned. I believe that this can only be explained by reflex action.

At first, massage causes a temporary irritation of the ulceration, and the increased vascular and nervous activity

which is thereby induced aids in the increased absorption, which is the direct result of the massage. The slight hemorrhages which occasionally appear have no significance, except as an indication that the massage should be very mild. Lukewarm injections morning and evening, and derivative movements, are also employed.

I have long noticed that, for derivation of blood in cases of leucorrhœa, separation and pressing together of the knees, together with elevation of the sacrum, are very effective, especially when employed in succession. Hence I give, immediately after the massage, two or three tolerably gentle separations of the knee, then three or four more vigorous pressings together of the knees.

If there is amenorrhœa, liftings and massage of the corpus uteri should be omitted, but massage of the cervix may be employed.

CHAPTER XVIII

NEW GROWTHS.

WHETHER any benefit can be derived from my method of treatment in cases of malignant tumor I do not know, as I have never treated such cases.

I have treated numerous fibromyomata of the uterus, but without much effect. In one case, however, two fibromyomata with narrow pedicles underwent atrophy as the result of daily massage of the pedicles; at the same time the profuse menses became normal.

The symptoms of this form of tumor vary greatly. Sometimes they cause no symptoms and hence furnish no subject for treatment. Sometimes, even if the growths are very small, they produce violent hemorrhages, which, as a rule, may be treated with the same success as other metrorrhagias.

When the tumors are larger, the patients may complain of occasional cutting pains or of frequent, painful micturition; they sometimes cause a mechanical obstruction to defecation. The pains often appear to result from peritoneal adhesions, or from direct pressure on the nerve trunks or the bony walls of the pelvis.

In many cases the pains disappear rapidly after we have succeeded in loosening the adhesions and making the uterus more movable. This must be done, however, with great caution. At first the uterus and nodules alone are masséed; then this is combined with shaking to and fro; after a while careful stretchings from one side or the other are added. When the adhesions are detached, liftings (third form) follow. Liftings have also been useful when the enlarged uterus was still movable, but gave rise to pressure symptoms.

Fibromyomata in the shape of polypi also give rise to severe hemorrhages, but such cases I always refer to the surgeon. After their operative removal, gymnastic treatment

may soon be resorted to if rendered necessary on account of hemorrhages. It has happened a number of times in my experience that, after the uterus had been masséed for a time on account of hemorrhages, polypi were forced through the os uteri, although they had previously escaped medical exploration.

CHAPTER XIX.

TUBES AND OVARIES.

If a slightly diseased ovary is compressed bimanually, the patient, as a rule, will experience a sensation obliquely backward and upward in the region of the loins on the same side. This is not true of a diseased tube. If the ovarian ligament can be followed to the uterus, it will be felt below the angle of the uterus, while the tube passes to the angle. If the abdominal walls are not too thick and too tense, the healthy tube can be traced, on the one side to the angle of the uterus, on the other side close to the ovary.

In several cases of disease of the tubes violent pains developed spontaneously about a week after the cessation of the menses. The pains lasted several hours until a clear fluid escaped from the uterus. This is never true of ovarian pain.

If an ovary is enlarged, its size can only be diminished gradually by massage, a little at each sitting. A tube, however, may be evacuated at once, often with the above-mentioned sensation of fluid escaping from the uterus.

Hydro-salpinx.

During massage the tube may be evacuated either into the uterus or abdominal cavity; the latter may prove dangerous in certain cases. If I feel that the elastic vesicle yields unexpectedly, I discontinue the manipulation at once and search carefully for a hardening in the median portion of the tube. This I massée toward the uterus on the following day, in order, if possible, to drive the fluid in this direction.

In the majority of cases I have succeeded in evacuating cystic tubes toward the uterus by suitable massage. Complete evacuation, however, has always occurred in the intervals, so that the tube had either collapsed entirely on the following day or gradually in a few days.

In other cases, at a time when I regarded the disease as

a sort of exudation, I have evacuated the cyst into the abdominal cavity without any bad results. More recently I have done this only in the few cases in which evacuation into the uterus has been impossible. It is particularly when a small hard dilatation was situated close to the uterus and another in the middle of the tube, so that I could not hope to evacuate the outer cyst into the uterus, that I have carefully evacuated it in the other direction. During the first few sittings I have expressed as little as possible. After its entire evacuation, the tube often enlarges again, usually a little while before the next menstrual period. I then repeat the method with the same precautions.

Hence I adopt the following rules. We must first, by means of massage, remove all obstacles to the passage of the fluid into the uterus, and then attempt to press the tubal fluid in that direction. If this does not succeed, then, in order to evacuate the cyst into the abdominal cavity, it is allowed to rest firmly upon the tip of the finger and against the pelvic wall, in order to employ massage with the free hand against this support, in the direction from before backward, until an extremely slight flaccidity is felt. This is repeated daily until the cyst is perfectly soft and empty.

The largest tubal cyst which I have evacuated into the uterus was about as large as a plum. The largest one which was evacuated into the abdominal cavity was about as large as a chestnut. In only one case did severe pains set in, shortly after the evacuation of an old tubal cyst into the abdominal cavity, but these pains lasted only six hours.

If the tubes are occluded in any part, relapses are apt to develop, so long as the women are still menstruating. This is an important reason for attempting to make the tubes permeable.

The first patient in whom I treated by massage such a disease of the tubes was a young woman who suffered severe pains about a week after menstruation; the pains always terminated abruptly with the discharge of fluid from the vagina. During the first week after menstruation the already enlarged end of the left tube gradually became swollen to the size of a walnut. I was present at the discharge of the fluid and found that it was clear as water and devoid of odor. During the course of treatment, which lasted a few months,

the swelling and pains gradually diminished, so that the patient was permanently restored to health.

Dislocation and Fixation.

In dislocation of an ovary upward and backward, without fixation, it is easy to reduce the organ by pushing it or by drawing upon the ovarian ligament. This cannot be done so readily if the ovary is adherent to any extent.

In 1877 I examined a robust girl who had long suffered from constant pains in the right loin. I found the right ovary along the sacrum high up posteriorly, about an inch above the fundus uteri; it was tender and as large as a plum. The organ could not be carried down along the lateral wall of the pelvis by gentle circular rubbings with the tips of the fingers of the free hand. But I pushed it forward across the end of the finger, introduced per rectum, and then downward, and then by combined pushing and pulling with both hands carried it over the posterior surface of the broad ligament downward and forward along the right side of the fundus to the right pubis. On the following day the ovary had returned to its former position, and I again reduced it, whereupon the pains immediately ceased. After a time the ovary remained approximately in the normal position and the pains stopped, but I heard subsequently that they had returned.

Since then I have treated several similar cases. The ovary was often found quite low behind the uterus, so that I was compelled to push it upward and then forward over the upper surface of the broad ligament.

The detachment and reduction of the ovary are greatly facilitated by massage. Stretching of the fixation should always be combined with massage. Detachment becomes necessary when the ovary, which is fixed posteriorly, has drawn the uterus backward so that it constantly returns after reduction. The detachment of strongly fixed ovaries is often quite painful in the first sittings. It is best not to stretch too forcibly at the start, but to repeat this cautiously every day. As we have said, the stretched fixing bands are always gently masséed at the same time. In difficult cases the index finger is introduced high into the rectum, if possible, behind the ovary. With the finger tips of the free hand we attempt, by

pressure against the supporting finger, to grasp the point of fixation, without compressing the ovary itself. At first we can often reach the base of fixation only from both sides, and the ovary is then shoved across the tip of the finger by means of circular movements until the base of fixation can finally be grasped. By means of small, circular rubbings we then test the mobility of the ovary until it is drawn taut, and is held firmly for a little while; it then receives a minimum overstretching in order to obtain a permanent relaxation. Then, while the stretching is maintained, massage is applied. This is repeated daily until the base of fixation can be grasped from different sides between the finger tips of both hands.

The ovary is sometimes situated too high or too far back to be grasped in this way. I then attempt, by placing the supporting finger against the base of fixation, to displace the latter a little by means of fine vibratory pressure; then I do the same from another side, and repeat this daily from different sides until the ovary has become movable to such an extent that the free hand can push it down slightly on the tip of the finger. When I arrive at that stage in which the base of fixation can be grasped between the tips of the fingers, I attempt to seize it as close as possible to the ovary, then to push it along the supporting finger by means of constant circular frictions, and thus to stretch and massée the fixation. The ovary is thus drawn more and more vigorously every day away from the wall of the pelvis until it can be carried into its normal position.

When the ovary is fixed against the anterior abdominal wall, it is much more difficult to detach and reduce it than in posterior fixation. The detachment is best effected by pushing the ovary backward with the fingers of the free hand, the support being applied with the tip of the index finger close to the fixation. When the ovaries were fixed to the inner side of the sacro-uterine ligaments, it was more difficult and sometimes impossible to detach them. They must then be pushed above these ligaments before the separation will succeed.

Adherent tubes are detached with the same caution as the ovary, the fixation being manipulated from both sides, without compressing the tube itself. During the circular movements of the tips of the fingers we should detach the tube

rather by rolling or stroking than by traction. The tube and ovary are sometimes fixed in common by an exudation. After the latter is removed by massage, both organs can usually be detached at the same time from the wall of the pelvis.

If, in posterior uterine displacements, a previously fixed ovary has been detached to such an extent that we may begin with liftings in order to correct the uterine displacement, the effect of the reduction of the ovary might be destroyed by the lifting. Hence I only treat the ovary after the lifting, and assure myself, at the close of the sitting, that the fundus is situated anteriorly.

Oophoritis, Peri-oophoritis, etc.

Small, painful swellings of an ovary without fixation can be relieved very readily and quickly by means of massage. When the ovaries are somewhat larger, their size can rarely be diminished to any notable degree, but the tenderness usually disappears quite rapidly.

Among the not inconsiderable number of cases which I have treated for a considerable period and have since kept under observation, in only a single case did I discover renewed growth of the ovary. Hence I incline to the belief that the development of an ovarian tumor may be prevented by early massage. This need only be continued until we are satisfied that no enlargement is taking place, *i.e.*, for from two to three months.

Larger ovarian tumors I have always transferred to the care of a physician.

I have often found that tolerably large nodules, which I regarded at first as ovarian, disappeared under the use of massage and derivative movements, so that finally only a normal ovary could be felt. I assume that in these cases the enlargements were situated near the ovary, because I do not believe that true ovarian tumors can ever be removed by means of massage.

If the uterus, in the region of the internal os, is drawn against the lateral wall of the pelvis, the tube and ovary are very commonly concealed in the thick and firm mass, or at least so firmly fixed that they cannot be clearly distinguished. Such exudations can be diminished gradually in size by means

of massage and derivative movements until the ovary and tube can be distinguished and then detached.

In patients who complained of pain on the outside of the hip, I have repeatedly found nothing pathological, but have produced pain by gentle pressure on the ovary of the corresponding side. In one patient, a young girl, a diagnosis of hip disease had been made, and an extension apparatus had been applied for six months. On examination I found no evidence of disease of the hip joint, but the left ovary contained a small but extremely painful swelling which was not larger than a pea, and pressure on which produced pain along the outer aspect of the hip. Massage was employed for a month, and produced complete recovery.

CHAPTER XX.

INFLAMMATIONS AND EXUDATIONS OF VARIOUS KINDS.

Patients who have suffered from peritonitis are often heard to complain of one or another symptom referable to the abdomen or abdominal walls. Careful examination then shows that the abdominal walls are less elastic and yielding than normal, and at the same time tender on pressure. Regular movements from the bowels are prevented on account of pain. Sometimes the ingestion of food is said to be accompanied by pain. Whenever the patients change from the recumbent to the erect position, they experience more or less violent pains. In many cases extensive exudations remain in the abdomen or pelvis.

Apart from derivative movements, massage of these exudations is the main feature in such cases. The non-infiltrated parts of the abdominal walls are treated with beatings which are very mild at first but gradually become more vigorous. Large, firm exudations into the abdominal walls often undergo rapid softening and disappear.

Inasmuch as pelvic exudations, after pus has formed, may become dangerous to life from rupture into the abdominal cavity, it is extremely important to ascertain the character of the exudation before beginning treatment. If pus is not present, the exudation may usually be made to disappear.

The treatment consists of derivative movements and massage of the exudation and surrounding parts, performed once or twice daily. If the exudation is situated too deeply in the pelvis to be reached by the free hand, the massage must be performed with the index finger in the rectum. In suitable cases absorption is also acceleraled by strokings per rectum.

At the beginning and end of each sitting, mild massage is applied to the lymphatics on each side of the promontory and the anterior surface of the sacrum.

Chronic Exudations.

Soft exudations not infrequently change their location. Sometimes massage will force a tolerably large exudation from the pelvis to the abdomen, or *vice versa*. This is made possible by the fact that the fluids move through the very loose cellular tissue outside of the peritoneum.

At the start, soft exudations are masseéd very gently. When the exudation has become firmer, and suppuration is to be feared, still greater caution is necessary in order to prevent rupture. When chill, febrile pulse or temperature is present, massage should be abandoned temporarily.

Where firm exudations have become chronic, treatment may be necessary for many months. These exudations may fill the entire pelvis, so that it seems surprising that the bladder and rectum are able to perform their functions. The consistence is usually very firm. In many cases the recto-vaginal septum is found, on examination through the vagina, to be stretched like an arch which extends forward toward the abdominal wall. Examination per rectum shows that the latter is narrowed and presents the shape of an open, round tube with firm surroundings.

In severe cases the massage of the firm exudations must be performed very vigorously, and hence there is danger that the inflammation may again become acute. At first, therefore, I always proceed with the greatest caution, and massée very gently with the tips of the fingers alone. Gradually the force employed must be increased. After being assured that suppuration need not be feared, I begin with vibratory pressure and kneadings with the wrist, and these are gradually made more vigorously until finally I use the extended arms and the greatest possible amount of pressure. I need hardly mention that each sitting begins with gentle circular frictions and also ends with mild massage.

Even in the most severe cases the supporting finger should be kept in the rectum or vagina during the massage, in order to be able to detect the effect of the pressure.

After the treatment of exudations by means of massage, relapses occur not infrequently, especially when the treatment has been abandoned too early. As a rule, the relapses appear to result from some imprudence on the part of the

patient, such as catching cold, excessive walking, etc. The recurrent exudation is often more diffuse, but, during the course of treatment, it becomes more circumscribed, is absorbed, and disappears like the previous exudation.

During menstruation and especially at the close of the menstrual period, I have repeatedly observed that exudations have a tendency to increase. Hence it is necessary to continue the treatment at such times in order that the fluids which accumulate every day may be masséed away at once. On the other hand, hemorrhages, particularly if profuse and persistent, facilitate the absorption of exudations. Massage always diminishes the exudation most effectively during the menses. With the cessation of menstruation we not infrequently notice a temporary increase of the exudation.

So long as the slightest recent swelling is again found at the next sitting, after the exudation has been removed by massage, the treatment must be continued.

More or less pronounced febrile movement often occurs in old rigid exudations, especially when they are vigorously masséed several times a day. When this takes place, the massage is performed more gently and briefly, and only once a day. In addition, cold water is applied to the limbs, rapidly dried without rubbing, and the parts wrapped in cloths. This hydropathic measure is repeated several times a day, according to the severity of the fever.

I will give the following illustration of my mode of treatment of exudations:

Mrs. A. W., æt. 35 years (in 1887), married ten years, had four children. In 1864 suffered from intestinal occlusion. Mild attack of peritonitis in 1866. First confinement in 1868. Metritis (?) after the third child. Another attack of peritonitis from October, 1875, to July, 1876. In March, 1877, another attack of peritonitis.

On April 18th, 1877, my treatment began. At that time the patient was still confined to bed, had painful remains of exudation in the abdominal walls; alternate diarrhœa and constipation. Menses were regular but scanty. The uterus was large, strongly retroverted, but movable. A large exudation in the left broad ligament. She was directed to dress

herself on the following day, and was treated once a day, for a month, in the following manner:

1. Sitting bent over—flexion of arm.
2. Half-reclining—massage of uterus, exudation, etc. (later, reduction of uterus).
3. Half-reclining—alternate stroking on abdomen and (*a*) transverse abdominal stroking (during constipation); (*b*) transverse abdominal concussion (during diarrhœa.)
4. Half-reclining—pressing together of the knees, with elevation of the sacrum.
5. Half-reclining—flexion of knee.
6. Half-reclining—kneading of legs, flexion of foot, extension and rotation.
7. Sitting bent over—alternate rotation.

On May 18th the patient had recovered, and remained well.

Acute Exudations.

If exudations are masséed twice a day, immediately after they have formed, their growth ceases very rapidly, sometimes even on the second day. As the danger and the pains usually disappear as the acute process ceases, it is then no longer necessary that the patients should maintain absolute rest, and they may then visit me twice a day if the distance is not too great. In the beginning, cold compresses or, better still, an ice bag are employed.

All physicians seem to be agreed that massage of acute pelvic inflammations must be avoided, especially if true peritonitis is present. In many cases, however, swellings, which developed with acute symptoms immediately after overstretchings, were successfully treated at once by cautious massage, often even twice a day. Whether the peritoneum was affected in such cases I am unable to say. In at least two cases in which the patients were suddenly attacked spontaneously with fever and violent pains and large exudations formed in the abdomen, I employed very mild massage of the abdomen four or five times a day, and with such success that the patients could walk around the room and were soon able to visit me. At the beginning, however, an ice bag was applied.

Apparent (Recurrent) Exudations.

The following condition I have observed in a few cases.

In 1870 I found in a patient a flat, rounded, soft, but distinctly circumscribed swelling in the hypogastric region, about half-way between the uterus and ilium. In addition there were several similar swellings along the anterior rim of the bone and on the lateral wall of the pelvis, between the spine and the lateral insertion of the broad ligament. After massage several swellings disappeared in a few seconds. I then made a more careful exploration and became convinced that I had to deal with fluids which could very easily be forced upward toward the abdomen, either into the hypogastrium or into the retroperitoneal space. So far as I could ascertain, they were situated in the extra-peritoneal cellular tissue. The pains were said to be of no slight character.

Day after day I found the swellings in the same localities. I gradually succeeded in curing the condition by means of massage, *i.e.*, kneadings and circular rubbings, together with derivative active movements.

I am acquainted with a woman who suffered for seven years from a similar affection. Medical literature has shed no light on this condition. It seems to be entirely devoid of danger, and to be relieved easily by ordinary massage when practicable, or by liftings and by kneading of the abdominal walls, combined with derivative movements. In treating such conditions more recently I have several times distinctly heard and felt the fluids escaping during the massage, at one time from the pelvis into the abdomen, at another time from one part of the abdomen to another.

Firm Swellings on the Pelvic Bones.

The first patient who came under my care for an affection of this character was unmarried, 50 years old, but still menstruating. Upon the inner surface of the left tuber ischii I found a nodule, as large as a nutmeg, extending a little into the spinoso-sacral ligament, and so hard that I could not distinguish it from bone. The patient stated that she had received a severe blow, several years previously, from falling upon a flight of steps. As the patient had also suffered for two years

from a painful ulcer of the tongue, I feared the possibility of cancer, and sent her to a physician, who recommended operative removal of the pelvic tumor. A tooth was removed, after which the ulcer of the tongue soon healed.

When the patient again came under my care, she suffered from poor appetite and sleep. A gynæcologist whom I consulted agreed with me that the operation should be deferred, and that my treatment should be continued. This advice was carried out, the patient improved, and in the following year was declared well by her physician. I again examined the patient ten years later and could find no trace of the disease.

November 16th, 1880, an unmarried woman, æt. 25 years, came under my treatment. In March she was attacked by abnormal hemorrhages and peritonitis, followed by a visible swelling, attended with pain in the left inguinal region. I found a small exudation on the left side at the transition of the abdomen into the pelvis, close to the pelvic wall; also a hard nodule on the tuber ischii, which extended farther into the ligament and was larger than the one described above. On January 30th this nodule was examined by the physician. At his second examination, on February 20th, it was softened and somewhat movable; on April 10th the hard nodule had disappeared, but a swelling still remained; on May 1st everything had disappeared.

These cases were treated chiefly by massage, with the index finger in the rectum. This was attended with great pain, so that I first made gentle strokings around the nodule in order to diminish the tenderness. I then made very brief frictions, increasing in vigor and rapidity, three or four times at short intervals, followed by a brief period of rest and gentle strokings. These rubbings were then repeated a few times.

The improvement and recovery of such affections were always attended with peculiar phenomena. The hard nodules gradually began to soften, but at the same time bloody mucus was discharged, partly with the stools, partly in the intervals, and the rectal mucous membrane exhibited deep folds over the nodule. The latter was converted gradually into a tolerably soft, elongated, and movable ridge, which could be pushed across the original site. After a time the bloody mucus dis-

appeared, the mucous membrane resumed its normal character, and all the symptoms were relieved.

Later I successfully masséed similar swellings on the inner surface of the sacrum. When they are small, they are apt to be mistaken for an ovary which is adherent to the sacrum. It must be remembered, however, that tolerably gentle pressure on such a small ovary would be attended with pain in the loins and hips; also that the nodule is much firmer than an ovary and is firmly adherent to the bone.

On account of the evacuations of bloody mucus, massage should only be performed once a day. In applying massage to such nodules in the posterior parts of the pelvis, the arm, hand, and index finger must be held in a straight line, and the movement of the finger effected by moving the entire trunk to and fro. We should sit below the patient's feet, facing her, and the arm placed between her strongly separated legs. The other fingers are held together, but kept nearly straight, and are turned toward the floor, the back of the hand being turned upward.

THE MODERN TREATMENT

OF THE

MORPHINE HABIT.

BY

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THE MODERN TREATMENT OF THE MORPHINE HABIT.

THE morphine disease, commonly called the morphine habit, has attained such prominence, with the discovery of the opium alkaloid, as to deserve the most careful attention of both physicians and laity. It will therefore be well worth while to occupy ourselves with the disease, and its treatment.

The morphine habit is a peculiar disease, being partly physical, partly mental, which is caused primarily by continuous and progressive morphium intoxication.

The reason for this intoxication, however, is the desire for a condition of ecstatic well-being, which condition is certainly attained in the beginning, but finally the influence of the drug scarcely causes a transitory amelioration of the permanent suffering. The cause is a psychical one, and must be fought and overcome mainly with psychological remedies.

The constant battle for existence, coupled with the high demands made at the present time upon the mind, is largely the cause of this serious and widespread affliction. The demoniacal character of morphine is such that the unfortunate patient who has once succumbed to its influence finds great difficulty in discontinuing its use. From the first injection to the final enslavement of the patient is a small step which leads to certain destruction. Just as the lower classes seek refuge from the cares and tribulations of daily life in alcoholic excesses, so does the cultivated man strive to forget his mental and physical troubles through the agency of morphine.

On account of the costliness of the remedy, and the difficulty of obtaining it, it is evident that its habitual use is confined to the upper classes.

While in most cases this disease is the outcome of physical

or mental suffering, yet there are morphine patients who commence taking the drug for the sole purpose of testing its famous powers, and who at length become helpless victims to the demon poison. A lesser contingent are those patients who are led to the misuse of the drug through frequent association with morphine habitués, or who are relatives of such persons.

Ordinarily, small doses will at the beginning successfully conquer physical suffering, and larger doses then finally dissipate the moral indisposition which soon follows. According to character, governed largely of course by various circumstances, the morphine patient may for years limit himself to smaller doses; but how rapidly, in many cases, the power of resistance is weakened, to be replaced only by a complete loss of energy! Then the doses are rapidly increased to from fifteen to thirty grains a day, and the appearance of the inevitable signs of poisoning force the poor patient to seek speedy relief.

Now comes the question, Where shall he go and how shall he subject himself to a cure? Time also plays a factor. The cure must be so arranged as to conform to pecuniary and business circumstances, and to occupy the least possible time. Moreover, it must be kept as secret as possible.

As concerns the latter point, a watering-place seems most appropriate. It may be visited for recreation or because of some light illness; rheumatism, for instance, is a widespread and common disease—at a watering-place. As may be readily understood, most of these patients would shrink from a recognized private asylum.

Let us turn to the main object of our treatise—the mode of treatment of the morphine habit. In order to annul the pathologico-anatomical changes wrought in the organism by the introduction of the poison, and to restore the functions of the affected organs to their normal condition, the poisonous stuff must be eliminated from the system. For this purpose, it is absolutely necessary that the patient submit to a cure by withdrawal.

There are three modes of withdrawal, the first of which, however, has been abandoned, or soon will be. They are known as "sudden," "modified rapid," and "slow" cure.

Formerly the cure by sudden withdrawal, whose chief ad-

vocate was Levinstein, and which was at that time almost exclusively employed at the "Maison de Santé" in Berlin, found much favor. The patient disappears in a private asylum, is deprived of his personal liberty, is forcibly cut off from all intercourse with the outer world, thereby rendering it impossible to obtain morphine by any secret means. This cure lasts but a few days. This method is very convenient for the physician, but for the poor patient these few days are terrible —for the seconds stretch themselves out to an eternity.

Dr. C. Schmidt, a physician of much experience in the morphine disease and its treatment, and the founder of a special asylum for such patients at Wiesbaden, writes as follows, in his treatise upon "The cure of nervous prostration and mental debility induced by the opium habit":

"If on the one hand we are obliged to protest against this practice hitherto in vogue, from the standpoint of the humanitarian, we are also compelled to observe that there are serious objections to it as viewed from the position of justice and lawfulness.

"The patient, by the desire of his family, and with his own consent (in many asylums he signs a bond to that effect), is robbed of his liberty in order to achieve a cure. But the patient does not know, and it is impossible to communicate to him in advance, what lies before him; consequently he is unable to gauge the sufferings in store for him; without suspicion he gives his consent."

When we consider the action of this "sudden" cure (which, moreover, is only possible when the patient is in good condition), we find that it is not a very encouraging method in any respect, nor one inviting imitation. One great danger which must not be undervalued is the appearance of the symptoms of collapse. Further, the tottering mental condition of the patient receives a violent shock, from which it recovers very slowly or possibly never. Moreover, there remains, as a consequence of the sudden revolution in an already weakened body, a lasting influence on the nervous system. A severe neurasthenia is nearly always the result of the sudden reaction.

The sole advantage of this cure lies, then, in the saving of time, and in the convenience of its execution. In other words, it is only a withdrawal and no cure. This advantage disappears absolutely when the evil consequences of the cure are

considered. Every disease must and will take its time in the progress toward recovery. The duration of the cure, then, depends entirely upon the nature of the disease. The main object is always to accomplish a real and permanent result by means of the cure.

Nor does this "sudden" cure, any more than the other withdrawal cures, prevent a relapse to the original trouble. The patients discharged as cured are as liable to return to the hypodermic syringe as are those cured by other methods. Thus all apparent advantages of this sudden method disappear and we are compelled to object to its employment in these forcible terms.

A second method, and one employed next in frequency to the slow method, is the "modified rapid" method; this lasts from six days to two weeks, exclusive of the time consumed in after-treatment, which is after all necessary in every case. The patient, after isolation and a bath, is allowed the same dose as he was accustomed to before entrance, for two or three days. These injections are, however, administered by the attending physician. At the expiration of this period, the injections are reduced one-tenth or one-twentieth, preferably at night. This is usually followed on the next day by very distressing symptoms of this reduction—great restlessness, fear, pains in all parts of the body, especially in the lower extremities. Less frequently there is hemicrania, hyperæsthesia, increased perception of hearing, smell and taste, vomiting and diarrhœa. Collapse occurs still less frequently, although it does occur now and then. There is, however, considerable debility as a regular result of this reduction. All these symptoms are made to disappear by the following injection, to reappear again subsequently.

The injections are best administered every eight hours—morning, noon and night. Sleeplessness is usually relieved by the evening injection.

The next day the dose is diminished very rapidly; still the bodily condition of the patient must be considered, for the danger of collapse must never be lost sight of. In this manner, by the fifth or sixth day, the dose is reduced to one-third or one-sixth of a grain. The final withdrawal of the last one-sixth grain will take from six to ten days longer.

In considering the pros and cons of this mode of treatment,

it is chiefly the short space of time consumed which commends it, just as in the sudden plan. The torturing symptoms following the withdrawal usually set in after twelve hours, and this period is always a frightul one for the patient. The cure is, however, always to be recommended when the patient, either from pecuniary or business reasons, finds it impossible to devote more than two or at the most three weeks to it.

Now let us turn to the third mode of withdrawal, to the so-called "slow" cure. Here I must again emphasize that the length of the treatment depends wholly and entirely upon the gravity of the disease: a morphine eater who has been accustomed for ten or twenty years to indulge in large doses cannot expect to be freed and permanently cured in ten days, any more than a severe fracture can be healed in ten days, however desirable such a result might be, on account of the circumstances of the injured.

Under ordinary circumstances the so-called "slow" cure is effected, aside from convalescence, in from two to six weeks. It begins with the removal of the chronic morphine poisoning; that is, by the reduction of the poisonous dose to a non-toxic one. In doing this we must keep the general condition of the patient constantly in mind. It is impossible to treat all patients after a common formula. The second task is to get rid of the habit of taking the small dose (usually one-third to one-half grain). The poison which has been insinuating itself into the organism for years must be eliminated.

Before considering the medical treatment, we must pay attention to a very important factor in the management of these cases.

We are apt to overlook the most important part of the trouble—the moral weakness of mind of the patient; we must not forget that the first task of the physician is to assist the debilitated psychical condition. This leads to the consideration of the psychical treatment. It will never be possible to render the weakened will-power strong and self-reliant enough to withstand the enemy—morphine—by force and physical influences alone. The employment of force would only result in causing the patient to seek avoidance of the treatment by dissimulation, fraud, and cunning.

If we aim at rational treatment, the first condition must be absolute confidence in the physician on the part of the pa-

tient. Berger's remarks are most appropriate in this connection: "Treatment requires not only the greatest ability, unbounded consideration, and deepest interest, but also mind and soul in the physician to the greatest degree. Hence not all physicians are adapted for the treatment of such patients; in fact there are very few, who by virtue of special gifts of mind and soul, exercise a beneficial and lasting influence upon the morbid mental condition of their patients."

The patient must become and ever remain convinced that the physician is his true friend. This is the one and only effective psychological agent without which no influence over the mind of the morphine patient can be obtained. To win this confidence, there is but one thing necessary, and that is the skill to impress the patient. Psychological study, knowledge of the world, and social routine are indispensable attributes for the physician. With these are required untiring diligence and inexhaustible patience. The physician must always be willing to enter into all the patient's complaints. Through such means of treatment, the patient regards the physician as a faithful ally in the battle against a common enemy; and thus he is easily induced to lend his aid to accomplish a cure.

Let us now consider the course and the ways and means of this slow-withdrawal cure from its medical point of view. I will give a description of such a cure, as it is generally carried out in this asylum for morphine patients, at the same time remarking that the asylum is a public one.

As soon as the patient enters the asylum he takes a bath, after he has been requested to give up his syringe and all the morphine which he may possibly carry with him; at the same time he is informed that, with his approval, during his stay at the institution all his clothing and effects will be examined. Should the patient nevertheless succeed in secreting or holding back any morphine, it will not be long before the physician discovers it. The attendants, servants, and other patients always betray him, when the patient does not do so himself by his continued good health. The reaction of the pupils is also an important sign.

A thorough physical examination of the patient during the first few days decides whether the process of withdrawal can be commenced at once or whether a preliminary cure is necessary.

In some cases such a preliminary cure is of great importance, and it may be a *sine qua non* for the withdrawal process. The indications for such a preliminary cure are furnished by the general condition, an existing important internal organic disease, or the original affection which led to the formation of the morphine habit. In combating this disease we must make use of every possible means of strengthening the body.

Among the organic diseases which make a preliminary cure necessary is a relatively frequent atrophy of the cardiac muscle due to fatty degeneration. Very often it is likely that the forced rapid cures which the patient had previously been subjected to acted as etiological factors in the production of this serious affection. In such cases we must endeavor to give the heart the strength and power of resistance necessary for the withdrawal cure, by the use of specific remedies, by a methodical Oertel treatment, or by an artificial imitation of the Nauheim treatment. In such cass the rapidity of cure must be reduced still more in order not to hasten the pathological process of degeneration.

We should attempt to get rid of an obstinate neuralgia before we commence the cure, by an operation, or at least we should attempt to relieve or cure it by other remedies.

At the conclusion of this preliminary cure, or at once if the latter is not necessary, we begin the very slow reduction of the large doses of morphine. During the first two days we allow the patient his customary dose so as to give him an opportunity of becoming used to the life and rules of the institution.

Then we must ascertain the daily dose from the patient, and must determine this as carefully as possible; as a rule, the dose is exaggerated. Incidentally I would remark that nearly all syringes used by patients measure inaccurately and usually hold from 0.3 to 0.6 of a cubic centimetre more than the supposed cubic centimetre.

Should there be any doubt as to the size of the dose, we can safely place it somewhat higher at the beginning.

The daily dose should be divided into three portions, given every eight hours. In cases in which the habit was of long duration, the doses had probably been taken irregularly—whenever the craving began. It is preferable for the attend-

ing physician to administer the doses personally. When very large doses are required to begin with, it will be necessary to deviate from this rule and to give the doses more frequently.

At the end of the two days, the original dose must be gradually reduced, while at the same time, care must be taken to keep the patient in a moderately good condition of health, and to permit him to feel as little as possible the approaching effects of reduction. The patient must also gradually be deprived of the injections during the night. It is best to give the injections at seven in the morning, three in the afternoon, and ten o'clock at night. With some patients it is also advisable to administer it before meals, as it then excites the appetite. Here also it is necessary to be governed according to individual circumstances.

In addition, we must never forget the original cause of the formation of the habit. An imprudent or too rapid diminution in dose sometimes increases the original trouble greatly. These considerations are rarely absent in serious cases, and may very much prolong the period of reduction. It then becomes necessary, in order to successfully treat such an attack, to administer an extra, increased dose. In the case of an asthmatic patient, for instance, under such conditions, life seems often endangered through symptoms of suffocation, and thus large extra doses are essential. Such an increase in dose may, in certain instances, require several additional days before the dose is again diminished to the size at which the attacks necessitated an increase. Take, for example, a case in which we had reduced the dose to one-half grain morphine *pro die* before a severe attack of migraine had necessitated an increase of five-sixths grain; this would mean a daily dose of one and one-third grains; then we would have to reduce again from this dose until we had arrived at the previous quantity.

In most cases the reduction will be tolerated very well and the patient will remain in good health. There are, however, cases, rather uncommon, in old morphine habitués, in which it is impossible to reduce the quantity beyond one-third grain, in which complete withdrawal is impossible. Such disagreeable or obstinate complications will arise in such cases that we must feel satisfied with reduction to this point.

The manifestations of abstinence—so much dreaded—

occur only in a very slight degree with this slow withdrawal: a little dulness, slight transient diarrhœa, slight pains in the limbs, especially in the lower extremities, and an empty feeling in the stomach—these are the most frequent symptoms.

Thus, in most cases, it is possible to reduce the dose to one-third grain in from two to three weeks, without much inconvenience to the patient. However, it must be stated that old habitués who have been in the habit of using thirty grains a day for twenty years cannot be cured in two weeks. In such cases the complications already alluded to will delay the cure.

"This period of reduction must be utilized as much as possible to strengthen the physically run-down patient, and to increase his weight, by suitable strengthening nourishment and the moderate use of tonic drinks." The patient must be carefully guarded from all mental excitement, and, as far as possible, perfect rest must be secured to him. This absolute rest, in the case of great weakness and fatigue, may be extended to from eight to ten days. Apart from the night, which the patient naturally spends in bed, he should also lie down the greater part of the day.

With reference to the use of tobacco during this period of reduction: whenever possible, smoking should be entirely prohibited. Indeed, the cure itself often prohibits it, as smoking upsets the appetite and is apt to produce heartburn and indigestion. A good quality of tobacco, especially Havana, is far preferable to other kinds (Holland, Swiss, etc.), because Havana tobacco contains not more than two per cent of nicotine, while the others all contain more—some having eight to ten per cent. The immoderate smoking of strong cigars, which is often the habit with morphine patients, may easily cause dyspnœa and palpitation of the heart, and may sometimes simulate attacks of angina pectoris.

Having arrived at from one-half to one-third grain daily, the second part of the treatment begins—the final withdrawal of this minimum dose. Here we encounter the greatest difficulties. We usually succeed in accomplishing this in four days without any medicines; in eighty-eight cases in this institute, seventy-one were cured without any other remedy.

During this time it is desirable for the patient to take a walk for several hours a day; but we must be careful not to

force or over-do matters, for every over-exertion is followed by increased *malaise* or even pain.

Formerly cocaine was considered the principal medical aid in terminating the cure. One-twelfth grain cocaine was added to each dose of morphine, and once a day an attempt was made to replace the morphine by one-sixth grain of cocaine. However, no remarkable results were attained by this method of treatment.

In this institute, in most cases in which such a substitute treatment is found necessary, codeine, or, better, phosphate or codeine, is employed. This alkaloid of opium is hypnotic, and besides it reduces the disagreeable effects of the withdrawal of morphine to a minimum.

It is best employed in ten-per-cent solution in hypodermic injection; not more than forty-five grains a day should be allowed. We used the preparations of Merck and Knoll. There follow absolutely no symptoms of abstinence. The general health remains good during this codeine cure; at the same time there is no euphoria. The breaking off from this follows quickly. Indeed this alkaloid is very speedily eliminated from the organism, and is absolutely non-accumulative. The codeine habit never occurs, because the medicine does not produce euphoria. The disuse of the remedy must, however, be effected in the asylum. As soon as the highest permissible dose of codeine is overstepped, there appears immediately an intense poisonous influence upon the spinal cord, with attendant headache, faintness, and obstinate nausea. Often this is accompanied by a painful burning urticaria, appearing suddenly upon various portions of the body. Very important in connection with the successful issue of the morphine withdrawal is moral influence, since, through the total disuse of morphine, even though it be replaced by codeine, the moral sense of the patient is extraordinarily depressed.

In our institute we have used codeine in thirty-five cases with excellent results, and in each case a perfect cure of the morphine habit has resulted. In one case a rather pronounced codeine habit followed; but in this case the patient was not only used to morphine, but had acquired the habit of taking chloral and amyl-hydrate since several years.

An excellent adjunct in the complete cure is often *méconarcéïques*, a derivative of opium; this is a French prepara-

tion, made only by H. Duquesnel, in Paris. As far as I know, the remedy has not been manufactured in Germany. There are three preparations of this remedy—syrup, pills, and solution. We used the five-per-cent solution, sterilized, hypodermically. This solution comes in glass tubes containing two and one-half drachms (five-sixth grain of the remedy). One or more Pravaz syringefuls are injected. The remedy is well borne and leaves no bad after-effects.

We have also obtained good results with the alkaloid of henbane, hyoscyamine hydrobromate; half a Pravaz syringeful of a one-tenth-per-cent solution ($\frac{1}{120}$ grain) is given for a dose.

Methylal in ten-per-cent solution, a syringeful three times a day, is often of service in quieting the restlessness.

Coffee also merits mention in this connection. A cup of strong black Mocha acts excellently in appeasing the resulting craving for morphine.

There is another important symptom which claims our most careful attention, insomnia. It is not only a symptom of the disease, but it is one which increases the tendency to the prolongation of the disease; hence one of double importance. When we consider the sad consequences of long-continued loss of sleep upon the organism, and especially upon the nervous system, we are prompted to increase our energies in the direction of giving the patient the benefits of sleep.

In this connection the question of rest presents itself, and forms the foundation for subsequent treatment. The morphine habitué bears to sleep a relation opposite to that of the healthy individual. With the latter, increased labor calls for additional sleep; but with the former this only causes painful hyperæsthesia and prevents sleep in the anæmic brain, even leaving out of consideration the fact that the influence of the hypodermic of morphine is lost, in most cases, under these circumstances.

However, what cannot be accomplished by active means can be brought about by passive exercise, massage. In addition the employment of the cold douche at night will facilitate sleep. In the morning the entire body should be washed with lukewarm water; this should be done in a warm room. Alcoholics are absolutely prohibited.

If, despite these procedures, sleep is not produced, we can

use codeine phosphate in doses of one to two and one-half grains. Care must be taken not to give more than this amount, and not to repeat it several evenings in succession; otherwise an intense *malaise* will emphasize the fact that we are employing a derivate of opium.

Muriate of cocaine also, in doses of one-sixth grain, preferably given while the patient is taking a warm bath, frequently induces sleep.

Bromine salts are not generally appropriate hypnotic remedies, as they exercise a paralyzing influence upon the nervous system and especially upon the vaso-motor centres.

Tribromide of allyl, whether in the French form of "capsulines au tribromure d'allyle St. André," from the pharmacy of M. Mousnier, in Paris, or whether subcutaneously, acts with certainty in the production of quiet sleep. However, the after-effects are not pleasant, so that the patient will not care to repeat the dose very often.

Antipyrine also may be used hypodermically, but it is well to add a little cocaine on account of the pain caused by the injection. Two injections of twelve grains of antipyrine and one-sixth grain cocaine often produce excellent results.

Amyl hydrate (Kahlbaum's, from Schering's pharmacy) occupies a high position in the production of sleep. Usually it works beautifully. Forty-five to sixty grains are given as a rule, though we can give as much as three drachms at a dose without any fear of evil results. The bad taste is neutralized by a piece of chocolate afterward. The patient must lie down quietly immediately after taking the remedy, otherwise the rapid somnolent effect may be lost. Combined with chloral hydrate, which must be taken some time in advance, its effect is often better and more lasting. In many cases the remedy has an additional advantage, in producing a beneficial after-effect, especially when combined with chloral hydrate; this is, that several hours after the primary light sleep, a deep sleep comes on and lasts several hours.

Finally, chloral hydrate alone, boldin chloralamid of Schering, paraldehyde, somnal, sulphonal, and methylal are often serviceable. We must try one remedy after another. Many of the remedies just mentioned, excepting chloral, are, however, often disappointing.

Extractum piscidiæ erythrinæ fluidum in doses of fifteen minims is often efficacious.

An excellent remedy for the obstinate constipation found invariably in the morphine habit and due to deficient peristalsis of the colon, is cocaine given hypodermically in doses of five-sixth grain. The injection is administered preferably when the effects of the morphine are waning. The effect is usually instantaneous, satisfactory peristalsis taking place and the discharge of voluminous, hard fecal masses resulting. All other remedies which have been recommended for this obstinate constipation are unreliable.

During the stage of reduction there is a tendency to the occurrence of abscesses and phlegmonous inflammations as a result of injections, as occur so often in the morphine habit. Great care must therefore be exercised in giving the injections. It is well to add a trace of solution of carbolic acid to the morphine solution and to be very strict in asepsis. We should endeavor to soften the old, hardened spots by painting with a five-per-cent solution of thymol in oil or with cataplasms of carbolic acid regularly renewed. In this way we tend to prevent inflammation at these points. We should avoid the points which are hardened or reddened. If, notwitstanding the employment of all these precautions, suppuration does occur, it will be necessary to open the abscess by incision; a preliminary injection of one-per-cent solution of cocaine will be sufficiently anæsthetic in these cases. We then empty the abscess completely and apply an antiseptic bandage. The canula of the syringe should be as short as possible, never longer than 1.5 cm. and the margins should be sharp.

A Seidlitz powder can be given for the nausea and obstinate vomiting which occurs during the reduction period. Capsules of ether also act well.

Let us now consider several other points which come up in every such cure. The only proper location for the cure is the house of a specialist in this line, or in a special asylum for morphine habitués. The number of patients collected together must not be too great, since each patient requires considerable time.

Season is also an important factor. The mild weather of spring and autumn presents appreciable advantages. The sultry days of midsummer are the worst. During mild, clear weather in spring, we can reduce the doses much more rapidly than during hot weather.

All apparent force must be discountenanced, and only secret restraint used; the patient must be watched in all he does, but must not be aware of this supervision. The patients in a public institution must live together as one family, and to accomplish this is one of the tasks of the physician in charge. This will be regulated by the social routine of the physician and even of his family. Dinner and supper should serve as diversion for the patients. The patient should not go out alone; he soon gets used to be accompanied without feeling that he is under restraint. In the morning a group of patients or all of them take a short walk; in the afternoon greater or lesser excursions are indulged in. In the evening they go to the concert, or an entertainment is arranged in the house. Such patients naturally shun all other society except that of the attendants, for it is to their interest to keep their disease from the knowledge of the world.

The complaint against public institutions, which is heard so frequently, that patients are able to obtain a supply of morphine, is unwarranted. All mail matter or packages are opened in their presence and examined. Here in Wiesbaden no one can obtain morphine except upon the written prescription of a local doctor; the existence of this institution being known, our pharmacists are very careful in this matter. Of course there are exceptions; but rarely do patients deceive their physician when it is against their own interests to do so.

Before considering the after-treatment, let us speak briefly of the morphio-cocaine habit. The cocaine habit, an offspring of the morphine habit, is a disease of recent date. When, several years ago, cocaine was introduced into therapeutics, there was joy in the hearts of the morphine habitués, for it was generally believed that an excellent and harmless antidote to morphine had been found. This remedy, which acted at first as a stimulant, finally caused complete disorganization of both body and mind. Four to six weeks of cocaine excesses are sufficient to produce a condition which renders the patient a fit subject for the insane asylum. Besides the deleterious effect upon the brain and nervous system, there is produced very rapidly, with increasing doses, marked general debility. Small doses of cocaine produce an effect which simulates morphine intoxication; large doses of morphine cause a simulation of cocaine intoxication. The cure of this habit

is very easy, and is usually effected in a short time—usually after three or four days. It is best for the patient to remain in bed during this treatment.

We will now consider the very important discussion of the after-treatment of the morphine disease; this, in brief, resembles that of the various manifestations of neurasthenia. Generally, patients think they are entirely cured and can resume their former occupations as of old; but they are soon undeceived. The weakened body and mind are not equal to the demands made upon them, and there is a tendency to resume the use of the syringe as before.

To begin with, the physician should propose a plan of spending each hour in the day, and this plan should be discussed with the patient every morning; then the patient must adhere to this very exactly: in this way he will become accustomed to carry out resolutions in a complete and fixed manner.

The same principles which are recognized in pedagogy to accustom children to obedience must be employed in the mental dietary of the morphine-habit convalescent. This principle leads us not to expect more in the beginning than the patient is able to do. But whatever task we have given him we must insist upon seeing executed without the least hesitation, objection, or evasion. In doing this we must not allow our requests to appear arbitrary.

The convalescent must absolutely avoid any work which is more severe than he can endure. He must use his strength moderately; if he is neurasthenic, he must also use his nervous force in moderation. He should never spend his entire nervous energy, but should always reserve some, and anticipate old age. If attacked with migraine, he should be careful of himself and nurse himself until the attack has passed. "Keeping up appearances" is a dangerous task, which he must avoid so as not again to become the slave of morphine. He should appear to be as he really is; then he never needs fear deviating from his rôle. *Ultra posse nemo tenetur.* Excessive work has been the starting-point in the formation of the morphine habit with many talented and busy physicians; in medicine especially, where activity and energy of body and mind are constantly required, the use of a remedy with which we can reproduce elasticity is very seductive. How very

happy is many a neurasthenic physician who increases his capabilities during the first few years by the use of morphine! And how bitter are the consequences for him!

During convalescence, slow assimilation and regeneration must be regulated and hastened by cool sponging, followed by lukewarm baths with douches, electricity of every sort, especially electrical baths with the interrupted induction current, massage, gymnastics, and finally walks and sports of every kind. In this manner, the nerves are made to regain their normal activity. On the other hand, these therapeutic resources must be supported by a mental dietary which should be carried out properly and with great patience and decision.

As soon as the patient is released from the institute, the relatives or friends are confronted with the task of leading the convalescent to his former occupation; this is no insignificant task. The wife of a cured morphine habitué should endeavor to keep from him everything that is disagreeable or unwelcome. The excellent advice of Dr. Levinstein should also be observed: Before the patient returns to his home, there should be apparent changes in the rooms which he has occupied; the furniture of the room which the convalescent formerly occupied should be changed; a complete change of residence is the most desirable.

Notwithstanding all these precautions and despite every effort on the part of physician and relatives, there will be a relapse in most cases, sooner or later; and this return to the habit is usually provoked by a trifling cause.

It is an incontestable truth that he who is subject to a relapse was not perfectly cured at the termination of the treatment. The object of the cure was not accomplished in such cases, although carried out in good faith and although perfect in regard to supervision and restraint.

The following two conditions are the only ones which will guarantee against a relapse into the old habit:

1. If the patient is cured, or practically cured, of his physical ailment, the results of the intoxication upon his nervous system and blood-mass.

2. If his psychological condition has become changed to the extent that he recognizes the necessity of continued abstinence and regards morphine as his most dangerous enemy.

A CONTRIBUTION TO THE STUDY

OF SO-CALLED

SCARLATINA PUERPERALIS.

BY

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SCARLATINA PUERPERALIS.

MEDICAL literature agrees that scarlatina occurs only rarely during pregnancy, but all the more commonly during the puerperal period, and especially during the first three days. There is no doubt, both on account of what is stated in literature on the subject and my own observations, that this "puerperal scarlatina" is caused in many cases by real scarlet fever. There is, however, a difference of opinion as to whether every case of scarlatina occurring during the puerperal period can be attributed to scarlet fever. The great mortality of "puerperal scarlatina," which is over fifty per cent, its occurrence immediately after birth, as well as observations of complicating, simultaneous inflammations of the genital organs and of the peritoneum—all these lent weight to the supposition that such cases were really one of the forms of puerperal fever.

Schröder[1] regards the majority of cases described as "scarlatina puerperalis"—a severe form of disease with extensive superficial, erythematous dermatitis—as "puerperal fever"; so does Thomas,[2] Winckel,[3] Brieger,[4] and especially Litten[5] in his excellent work on septic diseases; they have demonstrated the connection between exanthemata and wound infection. On the other hand, Olshausen[6] believes such scarlatinous exanthemata occurring during the puerperal period to be caused by real scarlatina; he adds that nearly all of the cases described in literature can be explained in this manner. On page 18 he writes: "Where has an exanthema resembling scarlet fever ever been seen in epidemics of puerperal fever with the usual peritoneal symptoms and the usual post-mortem evidences? There is no account of it in literature."

When such contradictory opinions exist in relation to a disease which is of such importance as regards prophylaxis as well as therapeutics, it is worth while studying the subject clinically as based upon personal observations at the bedside. Since Malfetti reported an epidemic of scarlatina in the Vienna Lying-in Asylum in 1799, there have been numerous observations on scarlatina during the puerperal period, both here and abroad; but the clinical value of these is lessened very much, especially in older literature, by the indefinite pathologico-anatomical and clinical data. A large number of cases can be classified with equal justice as puerperal fever or as scarlet fever. Omitting these cases, there are others of Olshausen,[7] Schröder,[8] Koch,[9] Braxton Hicks,[10] from which we can derive more definite clinical data regarding infection and the course of scarlatina during the puerperal state.

Corresponding to the fact actually observed,[11] that scarlatina can develop, in adults as well as children, as early as twenty-four hours after a given infection, we see the scarlatinal exanthema appear most frequently in puerperal women during the first three days. According to Olshausen (*l. c.*), in 89 out of 119 puerperal women, the disease began during the first three days; in no case did it commence later than the eighth day.

Previous association with patients ill with scarlet does not affect the pregnant women: not until the puerperal period does the infection show itself.

A case of mine, closely observed, is interesting in this connection. I treated three children, of an eighth-month pregnant woman of twenty-seven, for scarlatina. They were in poor, needy circumstances, and thus mother and children were crowded into one large room, poorly ventilated, representing the entire extent of the household. During convalescence of the children the mother was busy sewing white kid gloves; and I shall never forget seeing the oldest daughter (five years) smooth out the kid, prepare it for sewing, and reach it from her sick-bed to the mother—a mode of infection worthy the attention of the sanitary police. Two months later, after the children were up and perfectly well, the woman was confined without instrumental assistance. The day after, I was called to see the woman in the evening on account of the occurrence of a severe fever; several hours previous there had been a

chill, followed by fever, nausea, and great restlessness. The genital organs were found normal, and there was but slight tenderness of the uterus. There was very marked restlessness and a rapid pulse—140 per minute—with a temperature of 101.5° F. The next day there appeared an intense, even redness over the abdomen, then over the breast and neck; this gradually spread, so that on the afternoon of the same day it covered the entire body, including the face; the fever continued. Pharynx and soft palate were reddened; there were no necrotic spots on the tonsils and no subjective complaints in swallowing. After three days the fever subsided, the redness began to disappear, the puerperal convalescence assumed its usual course; there was the usual desquamation, especially on the hands and feet, testifying to the severity of the dermatitis. The genitals were without palpable or visible changes except that there had been a diminution in the lochia. The patient had escaped scarlatina during her childhood.

Such cases of scarlatina during the puerperal state are not so very rare. The characteristic signs mentioned in the cases reported in literature are, as in our case, the rapid occurrence of the exanthema, desquamation, slight throat trouble, slight tenderness of the uterus, and sometimes nephritis. The mortality in these cases varies with the character of the epidemic which happens to prevail; we are not justified, however, in assuming a special malignity for scarlatina occurring during the puerperal period, as is commonly done. It is characteristic of puerperal scarlatina that the symptoms occur during the first week and that the uterus is usually tender on pressure. Neither the supposition of a remarkably short period of incubation (Hervieux[12]) nor that advanced by Olshausen (*l. c.*) based upon the cases of Braxton Hicks, that this period lasts weeks or months, is satisfactory. It seems to me to be less forced, if we consider the disposition and the route of infection besides the infecting material, just as we do in most of the other infectious diseases.

While the pregnant woman is not susceptible to the poison of scarlatina, she is rendered especially susceptible to it by the physiological regeneration during delivery, as well as by the injury to the genitals, as observed by James Paget.[13] If we agree with Sulzer, that the scarlatinous virus is always carried into the system through a wounded surface—that is, as-

suming it to be a disease due to wound infection—we will find, even in normal confinements, injuries to the genitals which are not only sufficiently extensive to serve as entrances for the infecting material, but we will also find that the extent of wounded surface will explain the rapidity of development of the disease.

Based on the tabulated report and the extensive experience of Hoffa [14] on so-called surgical scarlatina which presents so many analogies to the puerperal variety, it seems very probable to me that in most cases occurring during the puerperal period the infection with scarlatina takes place through the genitals. The lightness of the pharyngeal symptoms in puerperal scarlatina as well as the tenderness of the uterus observed in most cases—even serious changes in the uterus—can be regarded as analogous to the necrosis occurring in the pharynx in scarlatina.

Opposed to this view of the occurrence of real scarlatina during the puerperal period are most of the reports of puerperal diseases found in older literature; these were regarded as special forms of puerperal fever associated with a scarlatina-like exanthema, on account of the great mortality.

About the middle of the last and the beginning of the present century, when we were endeavoring to classify the febrile puerperal diseases (which had already been distinguished by Hippocrates) according to their etiology, such diseases which were accompanied by exanthema first claimed attention. However, a perusal of the monograph of Eisenmann on traumatic and puerperal fever (Erlangen, 1837) forces the conviction that most of such cases were really examples of scarlatina and erysipelas epidemics. Helm was the first to distinguish a peculiar form of puerperal disease which he called purpura puerperalis (Monograph, Zurich, 1839); he distinguishes this disease from scarlatina, and describes in detail its course and therapeutics. On page 88 he says: "The following points indicate that it is not ordinary scarlatina: 1. Purpura puerperalis is not due to contagion and is not contagious. 2. It occurs only during the first few days after delivery, about the time when other puerperal diseases occur. 3. It occurs often without any manifestations referable to the mucous membranes. 4. There is no order in initiation, neither in the relation of the appearance of the exanthema to the fever; it appears at the

same time as the fever, often even before; there is the same lack of system in the appearance of the eruption—this usually appears on all parts of the body about the same time without any order. 5. Purpura puerperalis appears more often on single portions of the body; for instance, merely on the arm or the thigh. 6. It often comes and disappears several times in the course of the disease. 7. Its frequency or infrequency does not depend upon the occurrence of ordinary scarlatina."

The first proof—of non-contagion—advanced in support of the individuality of purpura puerperalis would speak against scarlatina, were it not that our experiences with real scarlatina have demonstrated without a doubt that, besides acquired immunity, which is relatively frequent in adults, there is often also a pronounced absence of disposition to infection, and that this protects. Helm's failure to have seen cases of contagion may have been chance or may be explained by the circumstances just pointed out. The peculiarities of the puerperal period, with its many forms, explains the other so-called proofs of Helm, and what we now know of scarlatina renders them valueless. The entire clinical account of purpura puerperalis shows that Helm observed and described real scarlatina occurring during the puerperal state.

Even the cases of puerperal scarlatina reported in more recent literature, which Olshausen (*l. c.*) regarded in a light most favorable to real scarlatina, render it probable that most observers really were dealing with cases of genuine scarlatina.

As much as I agree with Olshausen after a perusal of the literature just mentioned, personal observation does not permit me to believe that there are cases of scarlatina-like exanthemata occurring during the puerperal period which are not related to scarlatina and are only the expression of a septic disease.

In the course of the last year and a half, during which time I had an opportunity of observing and treating all acute exanthematous cases in females which occurred in the first division of the Charité, I found three puerperal cases in which the diagnosis of scarlatina had been made outside, among sixty-eight cases of scarlatina in all. These three cases gave rise to a question as to whether they were to be regarded as

true cases of scarlatina or as cases of a scarlatina-like erythema occurring in the course of a puerperal disease.

Of importance in answering this question is a point which has almost always been disregarded in literature—whether or not the patient has already had an attack of scarlatina. There is certainly immunity after an attack of this sickness, so that this fact may be regarded as of diagnostic value. Among sixty-eight cases of scarlatina among adults, observed by me in the ward for infectious diseases, there was not a single case that had had the disease during childhood. We must regard as exceptions those cases which have sequelæ which are regarded as the disease, and which, like the sequelæ of typhus, do not always come under observation.

If we assume such an immunity from scarlet we must be more careful in our judgment of the nature of the exanthema in the three puerperal cases which we are considering; for all three gave the history of having had scarlet fever. Even supposing that in two cases, I. and III., the patient was mistaken, this is not probable in the second case; for this patient had had scarlatina when full grown, and the disease had been followed by an attack of nephritis with dropsy.

It is more difficult to estimate the significance of the disease of the genitals and its relation to the exanthema.

Every acute infectious disease accompanied by a high temperature, occurring in the puerperal period, causes disturbance in the involution of the uterus and changes the lochial discharge; this may result in a suppression of the lochia—the condition feared so much in former times. The secretion decomposes in the genitals, becomes offensive, and may produce secondary disturbances having no connection at all with the primary infectious disease. In such cases the uterus will become tender on pressure and the retention of secretion may lead to a purulent parametritis—as has been observed by me in a case of typhus.

Another point must also be taken into account. I have already called attention to the fact that the scarlatinous virus may find an entrance in the uterine abrasions and may produce the same necrotic process in the uterus as is observed in the pharynx. The various changes in the uterus would then correspond to the many degrees of the process in the pharynx —from a slight angina to severe gangrene. Even well-marked

sepsis might follow secondarily as a result of the local scarlatinous necrosis, and thus real scarlet might run its course accompanied by a septic puerperal fever. Some cases can certainly be explained in this manner; and this applies also to the cases of surgical scarlatina in which changes are observed in the traumatic spots (Hoffa *l. c.*). But if we give weight to the point first mentioned—the immunity of scarlatina—we cannot imagine such a thing as scarlatinal changes in the uterus, independent of the fact that such genital affections as we are considering belong to the usual diseases of the puerperal period.

In the first of these cases, the clinical course as well as the autopsy showed that it was one of septic infection proceeding from the uterus. If we omitted mentioning the exanthema, no one would dispute, from a history of this case, that the patient died of puerperal fever. Even during life, pyæmic metastases were observed in both knee joints; these were due to the emigration of streptococci. It might be remarked that such joint affections also occur with scarlatina and sometimes become purulent; this is true and happens not infrequently in adults; but the turbid exudation, which is often rich in cells, never contains streptococci and other organisms—at least it never has in those cases which I have examined. If scarlatina be complicated with secondary septic trouble, there will naturally be similar metastases to those found in puerperal fever; a clinical differentiation will then be impossible. In the case I am alluding to, the course was so rapid that secondary pyæmia after scarlatina could be excluded, for this never develops until weeks after the commencement of the primary illness. The fact that the illness did not begin until eight days after delivery is also important; for no case of real puerperal scarlatina is mentioned in literature, in which the eruption appeared as late as the eighth day.

In the second of these three cases, the disease began four days after delivery; there was fever, pain in the pelvic region due to a purulent parametritis of the left side as demonstrated by an exploring needle; there was nothing peculiar in the course of the disease in this case.

In the third of these cases we could easily accept the explanation of endometritis produced by infection after a severe instrumental delivery In this case the only peculiarity was

the retention of decomposed lochia in the uterus, the disappearance of fever and exanthema after the evacuation of this secretion, and the return of these symptoms after a reaccumulation. In all three cases there were certainly changes in the genitals which explained the course of the disease sufficiently without taking into account the exanthema.

But what about the exanthema? In the cases just spoken of there was certainly no simple vasomotor erythema; for the duration, the desquamation, and the intensity of redness of the integument disproved this. In all three of these cases there was a real scarlatina-like exanthema.

The multiplicity of forms of real scarlatina exanthema cautions us not to lay too much stress upon peculiarities of color, extent, and duration. Even desquamation, which is so often regarded as characteristic, is not so valuable diagnostically; according to my observation this symptom is scarcely noticeable in many cases of scarlatina occurring in adults, and sometimes it is wanting; the condition and care of the skin previous to the attack of scarlatina and the intensity of the cutaneous inflammation determine this. There was an absence or mildness of the exanthema in the pharynx in all of these three cases; but according to the observations of Olshausen (*l. c.*) this cannot be used as evidence against scarlatina, since in most cases of real scarlatina occurring during the puerperal condition the pharyngeal symptoms are wanting. This is not at all difficult to understand when we assume that the uterus serves as entrance for the virus, and not the pharynx. The observations on scarlatina after operations would contradict all this; if we confine our consideration to those cases of surgical scarlatina in which infection through the wound was established by sufficient observation, we will find that the eruption began invariably at the seat of the wound, and thence spread over the entire body. At the same time, in all cases, an angina is spoken of.

Even though, in the three cases I am considering, the eruption was exactly like that of scarlatina, still, on account of the not infrequent occurrence of eruptions in traumatic diseases, we are forced to consider the question: Could not these eruptions have been caused by simple erysipelas or by a suppurative process in the genitals? In older literature scarlatinous and erysipelatous puerperal fever are often confounded. Both

terms are used indiscriminately by Eisenmann (*l. c.*) in speaking of this affection. The estimation of the exanthema occurring during puerperal fever as erysipelas found special support in the theory first advanced by English authors—that every puerperal fever was an erysipelas of the internal organs of generation. It is only since Fehleisen established the etiology of erysipelas, that further bacteriological and clinical studies (Gusserow) have shown the difference in the two processes. It would be difficult now, with our modern ideas, to confound the exanthema of scarlet fever with erysipelas. As observed in two cases of puerperal erysipelas, the clinical course is certainly very similar to a severe case of puerperal scarlatina; the only certain differential points are the slow extension in waves of the inflammatory erysipelatous process, the demonstration of erysipelas-cocci, and the direct transmisson of the erysipelas.

Cases of exanthemata occurring in the course of a purulent process or septic disease are comparatively frequent in literature, and every surgeon has had experience with skin affections in cases of traumatic disturbances before the antiseptic era. While a part of the cases of cutaneous erythema after operations can be referred to vasomotor disturbances of the integument and to nervous influences, others point to the absorption of poisonous chemical substances by the wound and their transmission into the circulation—whether these be ptomaines or ferments—on account of the resemblance of the skin disturbance to that often produced by the ingestion of crabs, strawberries, and certain medicines. It is my belief that exanthematous diseases, such as measles and scarlatina, whose etiology is still in the dark, belong to this class of so-called toxic erythemata. It is true that various authors have found an organism in the skin and in the blood of scarlatinous patients and have credited this with the production of scarlatina; but none of these have withstood the test of severe bacteriological criticism. I have made many attempts to isolate the organism of scarlatina from the integument and blood of such patients, but these have all turned out negatively. It seems probable to me that the cause of scarlatina remains localized at its point of entrance—most frequently the pharynx; and that from this point it carries a poison into the circulation, just as in diphtheria; this causes the erythema

and the severe parenchymatous changes in the internal organs; in diphtheria this would explain the occurrence of toxic neuroses and nephritis.

Some of the scarlatina-like erythemata occurring with suppurating processes can be explained in this way, while others can be attributed to embolic absorption of organisms in the lymph and blood-vessels. This explanation is also suitable to cases of exanthema occurring in the course of suppurating affections of the genitals.

If we consider the nature of infectious diseases in the light of modern research, and attempt to differentiate between the forms of puerperal diseases comprised by the term puerperal fever, we must divide them into cases of septic intoxication and cases of septic infection. In the former case the disease is due to an affection of the uterus or some other portion of the genital organs, and from this point putrid material passes into the blood, poisoning the organism; in the latter case there is a general bodily disease—organisms multiply in the blood and act mechanically or through the formation of ptomaines or ferments. Most puerperal diseases represent a combination of these two classes. The occurrence of the cutaneous affection differs, however, according to whether septic intoxication or septic infection preponderates.

Most of the cases of exanthema, not only in septic puerperal fever, but in infectious diseases in general, which have been described by Litten, Brieger (*l. c.*), and other authors, can be ascribed to either septic infection or septic intoxication of the skin. Such a case of severe, extensive skin affection is described by Litten;[15] the patient was suffering from sepsis extending from the finger, and this was followed by an exanthema over the entire body, which led to a separation of the integument; in no part of the skin could embolic processes be demonstrated; the autospy confirmed the diagnosis of sepsis. On the other hand, differing from these intoxication exanthemata, there are many cases in which microscopical examination of the skin affected in the course of infectious diseases (excluding the hemorrhages and formation of colonies in endocarditis ulcerosa) demonstrates extensive infiltration with micro-organisms; these usually reach the capillaries as emboli and cause destruction of the skin.

In support of similar observations of Brieger (*l. c.*) I will re-

late one of my own—a case of pemphigus during puerperal sepsis, which belonged to the category of infection exanthema. The patient was a multipara, 37 years old; she had had an abortion and the uterus had been emptied; this was followed by chills and then a pyæmic infection with metastases in the joints. Seven days afterward the patient was admitted to the Charité; she had a high, continuous fever. Three days afterward there was the formation over the entire body of small vesicles varying in size from a pea to a dime. The cutis was elevated like in burns, and the surrounding skin was not reddened. The vesicles first contained a clear serous fluid, but this soon became turbid and purulent. Most of the vesicles ruptured and dried up. An autopsy was made on the fourteenth day and revealed endometritis placentaris and thrombophlebitis parametritica streptococcica; there were also numerous streptococci-infarctions in the heart, kidney, and skin. Corresponding to the mixed infections in the puerperal state, giving rise to both intoxication and infection-manifestations, we may have both forms of cutaneous affection in the course of puerperal sepsis; thus there may be pemphigus vesicles in some places and exanthema in others.

The three cases which I have alluded to, I believe, belonged to the class of exanthema following intoxication. In the second and third of these cases it was possible to limit the collection of infection material to the genital organs; there was no extension into the blood and thence into the other organs of the body, but the intoxication of the system was shown by the febrile movement, the profuse perspiration, and the exanthema. In the third case, the fact that the exanthema disappeared after the uterus had been emptied, and returned again after reaccumulation of the decomposed secretion, shows that there was a connection between the exanthema and the suppuration in the uterus. In the first case, the autopsy leads us to assume that both forms of puerperal sepsis had existed; there was severe intoxication and also a propagation of streptococci from the seat of infection, causing metastases in the joints and organs. The absence of streptococci in the skin justifies the diagnosis of toxic exanthema.

The clinical observations of the puerperal cases just discussed leads me to conclude that, notwithstanding the scarlatina-like character of the exanthema, there was no real scarla-

tina, but a complication of a puerperal suppurative process with a scarlatina-like cutaneous exanthema.

Hence it is necessary to be careful not to make the diagnosis of puerperal scarlatina too rashly, because our decision largely influences the prophylaxis and the treatment of the case.

In every case in which a severe genital affection exists during the occurrence of an exanthema, we will do better practically to regard the exanthema as toxic (independent of subsequent prophylactic precautions); this will lead us to take prompt measures to combat the constantly increasing danger from the infectious mass.

BIBLIOGRAPHY.

1. Schröder: Lehrbuch der Geburtshülfe.—2. v. Ziemssen's Sammelwerk, ii., 2.—3. Pathologie und Therapie des Wochenbetts.—4. Charité-Annalen, ix. Jahrg.—5. Zeitschrift f. klin. Medicin., Bd. ii.—6. R. Olshausen: Untersuchungen über die Complicationen des Puerperium mit Scharlach und die sogenannte Scarlatina Puerperalis. Archiv f. Gynäkologie, Bd. ix., H. 2.—7. L. c.—8. Schneider: Dissert. Marburg, 1873.—9. Koch: Dissert. Giessen, 1868.—10. Braxton Hicks: Transact. of the Obst. Soc. of London, 1871.—11. Trousseau: Clinique Médicale, p. 101.—12. Hervieux: L'Union Médicale, 1867.—13. James Paget: Brit. Med. Journal, 1864.—14. A. Hoffa: Samml. klin. Vorträge, No. 292.—15. Litten: Ueber eine schwere Hauterkrankung im Gefolge allgemeiner Infection. Charité-Annalen, 1876.

The Influence of Alcohol

UPON THE

ORGANISM OF THE CHILD.

A Pharmacological-Clinical Study.

BY

PROF. R. DEMME.

INFLUENCE OF ALCOHOL

UPON

THE ORGANISM OF THE CHILD.

No branch of the science of medicine has, of late years, taken mightier strides, nor has, in equal measure, carried the results of scientific medical investigation into practical life, as has the doctrine of the care of health—hygiene.

Certainly the majority of our disciples, in natural philosophy and in special medicine, in physics and chemistry, physiology and pathology, and the numerous later specialties of medical studies—especially bacteriology—all these have entered the lists for the preservation of the health of mankind. They all contribute toward the overthrow of every disease-producing influence which threatens the life of the individual as well as the entire human race. In a certain sense, hygiene is not an independent science; it collects, however, as in one focus, the united results of scientific medical research as far as they relate to the welfare of the state and nation. In the study of human health, or hygiene, which should be familiar to every one, be he physician or layman, we see the commandments of the healthy human intellect supported by the results of scientific research.

If, then, we wish to make hygiene as useful as possible for the physical and mental development of mankind, and we desire to create, produce, and maintain for the state really healthy and strong citizens, our endeavors must be directed toward sanitary measures for the care and education of the child. Upon the normal, harmonious development of the bodily and mental forces of the child, and upon his preservation from weakening and disease-producing influences, depend the individual power of resistance at the age of maturity, his subse-

quent usefulness as a member of his family and as a citizen of the state.

The rearing of healthy children necessitates healthy parents. Youth spent under favorable sanitary conditions forms one of the most essential bases for the health and strength of the parents. The consequences of errors of nutrition, of care, and of bringing-up, especially during early childhood, often do not show themselves until later years, and they may even transmit their prejudicial effects to the following generation. We should not forget that, in view of the advancing development of its organism, the child is threatened by a far greater number of dangers and perils than is the adult.

Since the avoidance and removal of these harmful influences, as well as the preservation of the child from illness must be considered as one of the most essential tasks of the physician, it is clearly his duty always to examine anew, and in the most conscientious manner, all the conditions relating to the nutrition, care, and bringing-up of the child. The specialist in children's diseases, particularly, must recognize as one of his weightiest and most meritorious tasks the discovery and avoidance of the numerous errors which still prevail, some of which have crept into the customs of youth from ancient times.

From this standpoint, I have, for a term of years, impartially and carefully observed the habits of life of children, with reference to the regular use of spirituous drinks. This has led me to the firm conviction that this practice is harmful—in the children of the poor through the use of brandy, in the children of the rich through the daily use of wine or beer; in certain cases health is seriously injured and undermined by this practice.

This is my excuse for speaking of the influence of alcoholic drinks upon the organism of children; the subject treats of questions with which the social condition of our country and the welfare and healthy development of our people are intimately connected—hence of the greatest interest and importance.

From the work written by order of the Helvetic Department of the Interior by Dr. Schuler,[1] "The Mode of Nourishment of the Working Classes in Switzerland, and the Resulting

Spread of Alcoholism," it is evident that coffee and potatoes constitute the chief food of the poorest classes in many regions of our country.

When this insufficiency of nourishment makes itself felt, the parents, forced to hard labor, turn to brandy with the mistaken notion of making up this defect of nutrition. The older children also, who assist at work, receive daily their share of the drink, which is not insignificant. Add to this the fact that in these regions, especially in the country, children not infrequently have access to the brandy supplies of their elders; it would therefore be no exaggeration to call brandy the inseparable companion of the youth of these classes.

In the course of twenty-eight years which I have been connected with the Berne Hospital for Children, seven children were admitted suffering from symptoms of congestion of the brain, the result of heavy intoxication. The youngest of these was scarcely one and one-half years of age. The mother, a shelterless, wandering day-laborer, had regularly administered brandy in intoxicating amount to quiet the child; at last a deep sleep similar to that produced by opium set in, followed by convulsion, rendering hospital treatment necessary.[2] Similar observations in other countries have been reported by Baer,[3] in his meritorious monograph on the subject of alcoholism.

In such cases the early indulgence in alcohol is associated with extreme poverty or with the depraved habits of a pitiable class; but we also see the use of alcohol in the form of wine and beer given to the children of the wealthy as daily luxuries.

Under ordinary circumstances, it is merely a question of proportionately small quantities of spirituous drinks; but, on the other hand, very significant quantities of wine and beer are often consumed by the excited youth at celebrations, Sunday excursions, journeys, etc. This is naturally more apt to be the case in wine- and beer-producing countries.

The explanation of this indulgence in alcoholic drinks is, in the first place, ignorance of its harmful influence upon the child's organism; secondly, the widespread, erroneous idea that "alcohol is a restorative"; and finally the innate longing of children to "imitate the habits of their elders." There is still another manner which is really a reproach to us physi-

cians, by which alcoholic drinks find their way to the infant in the cradle, and to each succeeding period of childhood.

As early as the close of the eighteenth century Brown's doctrine had gone forth from England, that the cause of all diseases was a condition of either excitation or of weakness, either the so-called sthenia or asthenia. Against the latter, stimulants, especially alcohol, were found most effective. In the course of the first half of our century, this theory was made to cover various inflammatory diseases, and especially typhoid fever, by the English physician Todd and his disciples. For the most effective treatment of this disease, the administration of enormous quantities of alcoholic stimulants was recommended; it was no rare occurrence to furnish to a typhus patient two to three bottles of heavy red wine in addition to large quantities of champagne and cognac in the course of twenty-four hours; sometimes an entire bottle of cognac was given every day.

In the course of time it was proved—by Trousseau, Moneret, and Terrier, in France,[4] for typhus; by Liebermeister, Riegel, and Jürgensen, in Germany, for typhus and the so-called asthenic pneumonia; by Daret and Breisky for puerperal fever; by Leyden for pulmonary gangrene, and by Volkmann for erysipelas—that the administration of alcoholic drinks in the treatment of these diseases, within rational bounds, and by suitable individualization, may work very favorably; that fever and prostration were diminished; and that while the fever lasted no intoxication was produced by their use.

Partly through an unwise fanaticism for this favorable therapeutic influence of alcohol, partly without any cause at all, that which was so approved of for the most serious illnesses attended with great loss of strength, was employed in the treatment of acute and chronic diseases in general. Until very recently, a large part of the profession added cognac to the treatment of every form of febrile disease, even in children, and this usually without any exact dosage of the alcoholic. Even to-day, unfortunately, this happens in many regions. According to the fancy of the parents or nurses, the little patients receive larger or smaller quantities of alcoholic drink throughout the entire duration of their illness. The representations of the value, especially of cognac, in every form of disease, based upon medical authority, has taken such a hold

upon the laity that not a few mothers, very frequently at the suggestion of midwives, add a few drops of cognac to contents of the nursing-bottle of their infants. A large number of parents also give cognac to their older children during slight disturbances of nutrition; they offer the little ones considerable quantities of this panacea,[5] often for a period of weeks and months. Occasionally a wine rich in alcohol is employed in place of cognac; and the children of the wealthy are treated in the same manner as we have just pointed out occurs among the children of the poor in connection with brandy: there is no break in the regular use of alcoholic drink! This form of alcoholization which is introduced under the mask of medicine is the most difficult to exterminate.

Professor Nothnagel[6] cautioned against the use of alcohol, during the age of childhood, at the seventh congress for internal medicine in 1888. Amid the applause of the many physicians assembled, he characterized it "as shameful that in our time small children of two or three years should still be given wine and beer at table." In the "Deutsche medicinische Wochenschrift" of the same year, Professor Mosler[7] writes against the abuse of alcohol in a more general way. I myself have cautioned against the early regular use of alcohol, as well as against the medical abuse of alcoholic drinks, during childhood, in the twenty-second report of the Jenner Hospital for Children in 1884, among the reports of histories of cases relating to this subject.

The so-called temperance societies, and also the international congress convened for the consideration of the alcohol question, have exerted their influence, in a praiseworthy and fairly successful way, to limit the use of alcohol among children.[8] A series of writings have been issued from these quarters, which aim toward the desired end, partly from a purely economical, partly from a pedagogical, and partly from a religious standpoint.

All these efforts, born as they are from the noblest of motives, have as yet proved insufficient. The reason for this may be to a great extent that the hygienic influence of the use of alcohol upon the organism of the child has not yet been made sufficiently clear. Therefore we still frequentlyhear the question from both physician and layman, "Have alcoholic drinks, when used in moderation, really so much more of a

harmful influence upon the organism of the child than upon that of the adult?" and also, "Are children more liable to serious illnesses, especially of the nervous system, as a direct result of the early use of alcohol?"

Let us now endeavor to answer these questions briefly:

The active intoxicating ingredient of the alcoholic drinks used by mankind is ethyl alcohol. We will take for granted, in our observations, that these drinks are pure and freed from the heavy or fusel oil, leaving out of consideration the secondary effects of adulterated alcoholic drinks.

From a pathological standpoint, even the chemically pure ethyl alcohol must be regarded as a poison to the organism of man. Literature[9] records the death of a three-year-old child after a single dose of two and one-half ounces, and also the death of an adult after drinking eleven ounces, of pure ethyl alcohol. Even smaller doses may cause death in both ages, when taken upon an empty stomach and in an undiluted state.

Ethyl alcohol, which we will henceforth designate simply as "alcohol," is contained in very different quantities in the various alcoholic drinks in use. Thus, the brandy used for medicinal purposes contains about 55% of alcohol; that used as a beverage 45 to 50%; the various wines in common use contain from 8 to 10%; Malaga, which is so often met with in the nursery, contains from 17 to 28% of alcohol; beer also, harmless as it is considered, contains a considerable amount of aclohol: in good lager beer it amounts to 4.3 to 5.1%, in light, ordinary beer, to 3.8 to 4% by weight. Many a habitual beer-drinker, it may be remarked in this connection, may be made to consider by the simple calculation[10] that in a daily measure of five pints of a light, ordinary beer (containing 5% by volume = 3.9% by weight) he imbibes as much alcohol as is contained in half a pint of brandy.

We will now consider the physiological influence of a considerable dose of alcohol upon the healthy child's organism:

The influence of alcoholic drink upon the child naturally varies according as it is taken in a diluted or concentrated state, in a lesser or greater quantity, whether seldom or in regular daily succession. The physiological or pharmacological influence of alcohol upon the child's organism, to be considered, relates to the administration of accurately measured,

potent, but not dangerous doses of alcohol, diluted with water. The clinical observation of the cases of child intoxication[11] already reported, treated at the child's hospital, must naturally be regarded in the light of physiological experiments bearing directly upon the symptoms of the acute poisonous influence of alcohol upon the nervous centres. Let us add that hereafter also, whenever we have occasion to refer to the influence of alcohol in the shape of alcoholic drinks (cognac, wine, beer), we shall, for the sake of simplicity, speak of them only as alcohol-administration and alcohol-influence.

Alcohol is conveyed to the blood through the veins of the intestines, and to a smaller degree through the lymphatics. For a few minutes[12] after its entrance into the stomach, it can be shown in the venous and arterial blood as well as in the main trunk of the lymphatic system. Plethora of particular organs corresponds to the amount of alcohol escaping through the walls of the blood-vessels. The brain gives way the most quickly after the reception of alcohol.

The first influence of alcohol is to cause the action of the heart to become accelerated and the pulse to become increased in frequency; but the tension of the arterial walls, and the blood-pressure are, on the contrary, lowered. Certain observers, like Zimmerman, attribute the quickening of the pulse, not to the effect of the alcohol, but to the exciting influence of exterior causes. The distention and fulness of the blood-vessels are produced by paralysis of the vaso-motor influences; this explains the redness of face of the drinking-man.[13] The blood itself undergoes no change through the influence of the doses of alcohol under consideration.

At first, breathing is accelerated, then diminished, the excretion of carbonic acid being lessened.

Small doses of diluted alcohol excite and increase the secretions of the stomach. Larger doses, or those taken during the process of digestion, disturb and prolong[14] the digestive functions, and even cause a temporary cessation.

According to the observation of the majority of investigators,[15] absorption and assimilation are diminished in rate by even small doses of alcohol. Therefore it can in no way be regarded as assisting in the nutrition and development of the tissues of the healthy man.

Alcohol, especially in large and continuous doses, has a

temperature-reducing influence upon the child's organism. This decrease of temperature is the result of increased loss of heat; it is caused by the dilated blood-vessels of the skin, by the paralyzing effect upon the muscles, and by the reduction of the oxidation processes in the body.

With relation to its influence upon the central nervous system, alcohol, according to Schmiedeberg, belongs to the narcotic members of the fatty series. It is in the same group with chloroform; additional members of this group are the special anæsthetic, ether, and, among narcotics, chloral hydrate, paraldehyde, and urethan. In alcohol the anæsthetic influence is secondary to the "general stupefying narcotic" influence. In its acute toxic effects (the condition commonly known as drunkenness) there is at first a lessening of the function of the brain, next that of the spinal cord, and finally that of the medulla oblongata; these functions are lost temporarily, but are resumed when the condition changes. This also applies to the reflex excitability.[16]

We may believe that in cases of transitory influence of alcohol upon the central nervous system, it adheres but slightly to the cells; but in cases of heavy and constant disturbances of the functions of the central nervous system, the chemical affinities of the nervous elements are impaired and their vitality destroyed.

In children, this temporary acute alcoholic intoxication presents two groups of symptoms, each usually sharply defined. The first of these, the condition of excitation, is distinguished by great irritability and active muscular restlessness; this often reaches the state of clonic and tetanic general muscular spasms.[17] This period of intense excitaton, which is variable but usually of short duration, is followed by a state of heavy depression and paralytic prostration of nervous activity. In the cases of intoxication in children which have come under our observation, the children lay for from twelve to eighteen hours, and in one instance even thirty-six hours, in a heavy comatose sleep, out of which they could only be temporarily awakened by cold douches.

It is this effect upon the central nervous system which causes a far more intense and injurious influence of alcoholic drink upon the organism of the child than upon that of the adult. The convulsions which sometimes accompany the

period of excitation are analogous to those due to the toxic influence of the acute infective processes, of scarlet fever, diphtheria, etc., upon the nervous centres of the child; there is in these cases frequently an initial convulsive, so-called eclamptic seizure; among adults this seldom or never occurs.

Only comparatively small doses of alcohol have a transient lively and therefore apparently strengthening influence upon the nervous system of the child. Even here, this period of excitation is very soon followed by prostration.[18] The feeling of fatigue is only stunned for the time being by alcoholic drinks;[19] they permit forgetfulness of this feeling for a short space of time. This observation has been practically confirmed in adults. He who desires a stimulant, and wishes to avoid the weakening narcotic after-influence of alcohol, uses coffee or tea for that purpose, and not alcoholic drinks; thus, strong coffee upholds the failing strength in exhausting mountain-climbing. A larger dose of alcohol produces an instantaneous but not a lasting increase of strength. On this account many army dietaries have substituted coffee in the place of brandy. Even Polar explorers have abandoned[20] the use of alcohol during the coldest weather, and have substituted coffee or tea.

In addition, it may be mentioned that, from a purely pathological standpoint (Schmiedeberg), the appearance of the signs of excitation produced by alcohol may already be taken as evidence of the beginning of paralysis of certain cerebral functions.

The excretion of alcohol from the organism, according to Binz[21] and his disciples, occurs through the intermediate formation of aldehyde and acetic acid; the final products are carbonic acid and water. If the blood be overcharged with alcohol, which in children only occurs in exceptional cases, a small portion is eliminated in an unchanged condition by the kidneys, the skin, and by the air in expiration.

We arrive now at the consideration of the pathological influence; that is, the lasting and permanently injurious effects of alcohol upon the organism of the child. It must be understood that there is great variations in the individual capacity of the child for alcoholic drinks; this fluctuates to such an extraordinary degree that it is impossible to estimate in exact quantities the exact amount of alcohol which may be indulged in, at any particular age, without essential injury to the child's

organism, nor the limit beyond which injury and even gradual destruction would ensue. Thus, in 1884, a strong, fifteen-year-old boy, under treatment for trigeminal neuralgia at the Jenner Child's Hospital, exhibited all the characteristic signs of intoxication after a dose of seventy-five minims of cognac diluted with water; the repetition of this experiment produced the same result. Another instance was that of a very well-developed boy ten years old, who became intoxicated immediately after taking from ten to twelve drachms of claret. On the other hand, we can all recall, without doubt, instances of unusual capacity for comparatively large quantities of alcoholic drink among children. It stands to reason, that in children who are very sensitive to the use of alcohol, the organic troubles, soon to be spoken of, appear earlier, and also in more intense degree than in those who possess greater power of withstanding the influence of alcohol.

Daily doses of from one-half to two and one-half teaspoonfuls of cognac, which is erroneously regarded as "strengthening" to children by parents and nurses, and which is added to their water or milk, often cause a disturbance of the digestive function in children between two and five years of age; they produce chronic irritation of the gastric mucous membrane with dyspepsia.

Particularly injurious are alcoholic drinks when given between meals. They create, as I have frequently convinced myself by an investigation of the contents of the stomach, exessive acidity of the gastric juice (greater formation of organic acids), rarely over-production of free hydrochloric acid. The albuminoids are generally easily and rapidly digested by these children; starchy food, on the contrary, very slowly and sometimes not at all.

Obstinate cases of chronic catarrhal gastritis and enteritis are often produced through the swelling of the lymphatic glands of the intestinal canal; there is rapid loss of weight, and, unless the alcohol be discontinued, a loss of strength, which it is impossible to check.

In certain rarer instances, the continuous and plentiful use of alcoholic drinks, especially brandy, results in the serious organic trouble of the liver, called cirrhosis; there is a preliminary hypertrophy and then a contraction of the connective tissue surrounding the blood-vessels, nerves, and bile-ducts of

the liver; finally there is ascites. Birch-Hirschfeld, in Gerhardt's "Handbook of Children's Diseases," collected [22] seven cases of genuine cirrhosis, the result of the abuse of alcohol, in children between the ages of eight and fifteen. In the twenty-second report of the Jenner Children's Hospital, also, may be found two cases of cirrhosis with fatal result; these were two boys, four and one-half and eight years old, addicted to frightful quantities of brandy.[23]

The question has frequently arisen whether the disturbances of nutrition just described as brought about through the chronic abuse of alcohol retard or even wholly arrest the growth of children;[24] as far as the children of alcoholics are concerned, as we shall see later in our observations on the hereditary influence of drunkenness, this may be accepted with a considerable degree of certainty. But there is also a similar influence upon the growth of children not burdened by hereditary alcoholism, making itself apparent as the result of the very early use of alcoholic drinks, partly owing to the development of rachitic diseases. In a compilation of twenty-seven cases free from hereditary alcoholic influence, all of which were under-developed in length by comparison with normally deveoped children of the same age and whose diminished size was confirmed by reference to normal size given by Vierordt, Vogel-Biedert, and others, there were nineteen cases in which an early, abundant, and regular use of alcoholic beverages had been indulged in.

In three of these cases it was shown, by periodical measurement, that after complete withdrawal of alcohol a very active increase of growth took place as compared to that formerly occurring in a corresponding period.

The most important disturbances of the health of the child following the early and immoderate use of alcoholic drinks appear in the nervous system. If we consider the serious and lasting anatomical lesions which are developed in the cerebro-spinal nervous system of the adult addicted to the use of alcohol, we are impressed with the fact how much more readily the child, with its extremely tender, sensitive organism, must succumb to the deleterious influence of alcoholic drinks.[25]

This work of destruction is all the more complete from the fact that the undermining influence is at an early period of life

brought to bear upon the organs—especially the brain—when they are in an active state of development and growth. The plethora of the central nervous system in the first stage of life, the well-known tendency of the brain and its membranes to congestion and to threatening serous infiltration and to inflammatory conditions, show *à priori* that the artificial increase in arterial tension produced through the influence of alcohol is full of risk, and irrational.

As a matter of fact, this conclusion is confirmed by our researches. From cases occurring during a period of twenty-eight years at the Jenner Hospital for Children, we have collected a series of published observations, partly from the twenty-second, partly from the twenty-seventh, yearly report, which confirm the truth of these conclusions. There are cases of epilepsy and chorea,[26] in older children, not affected with hereditary alcoholic influence, in which, according to the history of the case, the copious and steady use of alcoholic drinks was unquestionably responsible for the seizures; the etiological importance of the alcohol in these cases is proven by the fact that after the complete withdrawal while under hospital care, without the use of medicine, the epileptic attacks ceased,[27] and the chorea was cured within a comparatively short space of time.

With reference to the question whether in childhood, the more serious illnesses are directly influenced by the early use of alcohol,[28] I repeat that, in accordance with our observations, there is no doubt that marked excesses in brandy, also in wine,[29] may lead to genuine epilepsy, certainly one of the most serious and obstinate diseases of the nervous system. Fortunately, however, this result of alcoholism is of rare occurrence.

The observations of Dr. James Edmunds[30] are also appropriate in this place. These demonstrate the probability of the sequence of convulsions and other forms of brain irritation upon the plentiful use of alcoholic drinks given by mothers and nurses for the purpose of quieting the infant; the author also connects subsequent imbecility and even idiocy with this habit.[31]

The most important point of all, for the young individual himself, for his family, and for the state, is the paralyzing influence of the misuse of alcohol upon the moral faculties. The boy or youth addicted to the plentiful use of alcoholic drinks,

in consequence of their paralyzing effect upon the will power, gives free rein to his weakness. So, finally, he does not shrink from all sorts of debauches or even crimes, and not rarely ends his career by suicide. Doctors and lawyers have abundant opportunity, unfortunately, for observing the development of these sad lives, these sacrifices to alcohol.

I may here be permitted to call attention to one of the effects of the use of alcohol which should interest both parents and educators, and which up to the present time has not yet been made sufficiently clear; at least it seems not to have been thought worthy of consideration. Throughout entire civilization of both the old and especially the restless new world, there is heard a complaint of increasing nervousness. Under the head of neurasthenia we now class the widespread condition of exhausted nervous strength—irritable feebleness. The sufferers from neurasthenia are not only those of ripened years, who are inflicted with the heavy demands made upon them by their calling, or those who have to sustain the burden of labor and are forced to work out their lives amid the hue and cry of large cities—our youth, also, has to some extent fallen a victim to this modern sickness. How many pupils of from twelve to fifteen years of age present examples of weakness, complain of headache, palpitation of the heart, sleeplessness, restlessness of mind, and numerous similar nervous sensations, or give the impression of stupidity on account of lack of interest in their surroundings? Loss of memory,[32] unnatural drowsiness and lassitude, complete the picture.

It is certainly with justice that physicians and educators, especially in more recent years, are interesting themselves in the investigation of the causes of this increasing nervousness among school children. The examination of the efficiency of systems of instruction and the influence of instruction go hand in hand with the attention paid to the arrangement of schoolrooms, the influence of conditions of light, air, and heat, and the construction of school benches. It cannot be denied that part of the physical and psychical defects of our rising generation is to be traced back to over-exertion of the mental powers, insufficient sleep, and especially lack of free exercise. The efforts now being made, by our hygienists, to bring about a rapid and fundamental change in these conditions should therefore be appreciated.

The causes of this growing nervousness among school children, however, are not confined to the detrimental influences of school life. The unsuitable and unhealthful mode of life of our children, above all the early and rapidly increasing use of alcohol, contribute largely toward that end. We have satisfied ourselves in many instances, through professional inquiry and observation, that not a small contingent of these pupils "who became nervous at an early period of life" belong to the class of young people that we are discussing, who, "from their earliest infancy have never been free from the use of alcohol, owing to this strengthening craze of the parents." The combined paralyzing influences of alcoholic drink upon the youthful brain injures that integrity which is necessary for its normal physiological function; the organ thus injured is unable to fulfil the requirements of school routine, and then comes over-exertion of the nerve centres, forming the commencement of the nervousness which appears later. Here, again, is an opportunity for hygienists to investigate and combat the injuries produced through the early use of alcohol.

Experience teaches that such nervous young-old men may still be saved, and their natural youthful development restored. The banishment of the use of alcohol from their habits of life, sensible food, and a hygienically regulated hardening mode of life, are the first conditions necessary for this regeneration.

I may here mention an experiment made by two, to my knowledge, thoroughly reliable men who were prejudiced in favor of the moderate use of wine by older children. They experimented upon their own boys, aged between ten and fifteen, in order to convince themselves whether a moderate use of wine would tend to increase their energy for work both at school and at home, or diminish the same and tend to produce lassitude and prostration of mind and body. The quantity of light table wine given to the younger boy was about two ounces; to the older, three ounces, each, at dinner and at supper. The wine was always diluted with water and drunk during the progress of the meal. These experiments were conscientiously continued for a year and a half, in such a way that several months of indulgence were alternated with several months of abstinence; as far as possible, the influence of season was also considered. The result of this experiment,

kindly confided to me, was that during the period of indulgence in wine the boys appeared feebler, sleepier, less inclined to mental work, and that their sleep was more restless, more frequently interrupted, and consequently less restful and refreshing. So striking and troublesome were these symptoms for the boys that, of their own accord, they begged that they might be permitted to dispense with wine.

Up to this point we have viewed the physiological and pathological influences of alcohol upon the young, as produced by the direct reception of alcoholic drinks. But the child labors under still other influences of the poisonous qualities of alcohol, more destructive and quite independent of itself. The following paragraphs will prove that drunkenness of parents injures the resistance and health of their offspring, and may be hereditarily transmitted to them.[33]

The transmission of the qualities, faculties, and peculiarities of body and mind from parents to children, or, omitting one generation, to later generations, belongs to the most interesting, in many directions still obscure, phenomena of nature. Day after day we see that certain peculiarities of parents are transmitted to their descendants. This goes so far that in certain cases we identify the son of a man well known to us, even though we see him for the first time, as the child of this acquaintance; this we do by the cut of his features, his expression, the sound of his voice, and so on. Thus, we often see a decided gift for languages, for mathematics, or for mechanics, or a prominent artistic talent transmitted from generation to generation. In the family of Bernoulli, there was a succession of prominent mathematicians; in that of Bach, of gifted musicians.

But physical defects and deformities, or certain tendencies to diseases of mind or body, may also be carried from generation to generation.

Until very recently, physicians and pathologists believed that acquired deformities also, and illnesses, might be inherited. Virchow,[34] in a work which recently appeared, took this view. Darwin[35] likewise believed the same, and made use of the acceptance of the inheritance of changed and newly acquired faculties of the individual upon his descendants, in the support of his theory of the variation of the species. Häckel[36] also accepts the same point of view.

Ziegler takes exception to these views, and bases his belief upon the works of Hertwig,[37] Van Beneden,[38] Strassburger,[39] Weissmann,[40] Kölliker,[41] Flemming,[42] and others, as well as his own investigation; Ziegler[43] believes "that pathological peculiarities acquired in the individual life of a man are not inherited, and that seemingly hereditary deformities or diseases in a family may be traced back to variations (or to pathological changes?) in the germs of that individual in whom this affliction first appeared."

This second theory of inheritance certainly corresponds more closely with the facts which have been presented to us by developmental research. Nevertheless a series of observations which favor hereditary transmission of acquired disease are of considerable value.

Among the diseases which are transmitted in families from generation to generation, and which show themselves by functional disturbances and partly through anatomical lesions of certain organs of the body, the principal ones are: Mental diseases, and diseases of the central nervous system related to the former, hæmophilia, progressive muscular atrophy, diabetes insipidus, gout, and certain diseases of the eye—color-blindness, myopia, albinism, and retinitis pigmentosa.

The relative heredity of the mental diseases which form such an important part of our paper is placed at 28.9% by Hagen,[44] 25% by Leidesdorf,[45] 55.3% by Von Speyr,[46] and as high as from 69 to 85% by Forel,[47] of Zurich. Déjerine regards heredity as a factor of the greatest importance in mental diseases; he states that in the succeeding generation either the same or another mental disease may appear, and also that such diseases of the nervous system become more serious from generation to generation; he designates this form of heredity as degenerative heredity.

The alcoholic habit and its various manifestations—acute alcoholism, so-called alcoholic dementia, delirium tremens, and chronic alcoholism—are now generally classed as mental diseases. They are here considered as specific alcoholic psychoses. Regarding heredity, the preceding remarks about mental diseases in general apply. The alcoholic habit in parents may be the expression of an inheritable psychopathic disposition which may show itself in the next generation as alcoholism or as a mental disease of some other form. The injury to the

descendants of parents who abuse alcoholic drink is explained by the fact that this abuse probably interferes with the nourishment and development of germinal cells.[48] The saying of Plutarch, "Ebrii gignunt ebrios" (drunkards breed drunkards), illustrates the position of the ancients on this question.

A series of well-known investigators of this subject attest the hereditary transmission of the alcohol habit. Thus Lucas,[49] in his "Traité Philosophique et Physiologique de l'Hérédité Naturelle," quotes various observations of Gall, Girou de Gusareingue, and Louis, who mention this heredity. Dr. Day demonstrates this hereditary tendency by this observation: In families in which the father became addicted to drink late in his married life, the children who were born after this period showed the same tendency, while those who were born previously were free from this vice. Similar illustrations are mentioned by Baer,[50] taken from the observations of Thompson, Garman, Mitchell, and others.

In Moreau's[51] work on the mental diseases of childhood also, there are a great many examples of heredity of alcoholism and of the appearance of this in the very earliest epoch of childhood. Weiss and Stadler[52] claim to have seen delirium tremens in children four and five years of age; this is a form of alcoholism that I have not yet seen in children.

The form of alcoholism which seems to have a special hereditary tendency is dipsomania; this is a periodic desire for drink occurring in the form of an unquenchable thirst. We had numerous opportunities of seeing examples of this sort with demonstrations of undoubted heredity in the Children's Hospital in Berne.[53]

In addition, I will state that Parrish[54] explains the heredity of the alcoholic habit by the fact that the nervous, irritable, and weak individual has inherited the irresistible desire for stimulants—hence the desire for alcohol.

Magnus Huss[55] and many other investigators attribute the occurrence of the alcoholic habit in the offspring of alcoholic subjects to neglected education and bad example of the parents. But this view is controverted by a series of observations[56] which prove that the children of alcoholic families, who have been taken away from their parents and reared in changed and favorable surroundings, have after all developed the desire for drink in later life.

If those pathologists who claim that peculiarities and diseases acquired during single life are hereditary are correct, then acquired alcoholism in an individual who is not affected psychopathically can be transmitted and can show its deleterious effects upon the offspring.

The depravation of posterity through the drunkenness of parents is a question of great importance to the state, with reference to the military capabilities and powers of endurance of her citizens. The observations of prominent physicians and conscientious statisticians, in this connection, show alarming results. Erasmus Darwin[57] asserts that the diseases arising from the misuse of alcoholic drink are transmitted to the third or fourth generation, and finally result in the extinction of the family. Roesch[58] shows that, out of 97 children who had drunkards for parents, only 14 remained free from vice. According to Lunier,[59] 50% of the idiots and imbeciles of large cities are the offspring of habitual drunkards. The former superintendent of the Burghölzli Insane Asylum, Professor Hitzig,[60] positively asserts that the children of drunkards inherit an equal, if not a greater, disposition to diseases of the nervous system than the children of nervous parents or those of unsound mind; such children die from convulsions and other epileptic conditions in their earliest youth, more frequently even than do the children of nervous parents.

A deterioration of race in so-called "drinking regions" was also shown, according to Baer, by the fact that the military draft here produced a smaller contingent of men fit for military service than in the more temperate parts of the country. Gyllenskiöld[61] proves that in Sweden, since the favorable influence of the statutes issued against drunkenness have taken full effect, the number of men unfit for military service on account of general weakness and too small stature has become perceptibly lessened.

The report[62] of the Department of the Interior, of Berne, of 1874, referring to the establishment of a model distillery, says: "It is in the widespread consumption of brandy in our canton, without distinction of age or sex, that we find the explanation why the average size of our citizens seems to be diminishing; why fine, strong, large, and vigorous figures are becoming more rare; why in some transportations of recruits we see so many small, bent, early-aged individuals with sallow,

expressionless, almost stupid faces; why the number of cases of acquired mental diseases is increasing." Let us hope that in our own country, also, the recent legislation concerning alcoholics may improve the character of the military draft and result in an energetic, progressive improvement of the race, and that it may produce a similar favorable result as in Sweden.

I confess that the reports upon the depravity of the people through alcoholic drinks, upon the high rate of mortality and the still more alarming number of serious diseases of the nervous system among the children of alcoholic subjects, seemed to me exaggerated, too general in estimation, and too uncertain. On this account, as early as 1878, when several severe cases of alcoholism entered the Child's Hospital for treatment, I began to follow and observe as accurately as possible the family relations of some notorious families of drunkards who came under my observation, with reference to the hereditary influence upon ascendence and descendence, the capabilities of their offspring, their conditions of health, and their further development. The selection of these families occurred without prejudice, and only with reference to their large families, to the absence of goitre, to the possibility of obtaining reliable information concerning their relations, or to their relationship to well-known individuals or officials. The fathers of these families were day laborers, servants, peddlers, or also stone-breakers, raftsmen, coopers, etc.

By way of comparison with these notorious families of drunkards, I also selected from the circle of my dispensary practice (again only with reference to large families) a number of families belonging to the same classes of labor, of whose sobriety as regards the use of alcoholic drinks I had become convinced, partly by my own continued observation, partly through the reliable information of relatives, other tenants, and employers.

Thus, from 1878 until to-day, during a period of twelve years, I obtained accurate knowledge of the private circumstances of ten families belonging on the one hand to the drinking, on the other to the temperate, class. The results may be found in detail in the Twenty-seventh Yearly Report of the Jenner Hospital for Children.[64] I shall give here only a short *résumé:*

The direct posterity of ten families of drunkards—in which alcoholism of one parent or of both or even of previous generations, is shown—amounted to 57 children.

Out of these, 25 children died during the first weeks or months of life, part of them from lack of vitality, part through eclamptic seizures (œdema of the brain and its membranes). Six children were idiots, 5 children exhibited marked backwardness of growth in height, remaining almost dwarfish. Five children, as they became older, were attacked with epilepsy. One boy was attacked with severe chorea, terminating finally in idiocy. Five children had congenital diseases (chronic hydrocephalus, hare-lip, club-foot). What is especially interesting is that two of the epileptics referred to,[65] were themselves given to the abuse of alcohol as a result of hereditary transmission; the outbreak of their trouble was directly connected with most acute alcoholic intoxication, *i.e.*, was directly continuous with it.

Thus of 57 children of drunkards, there were only 10, or 17.5%, in normal condition and with normal development of body and mind, at least during their childhood.

Contrast this with observations upon the ten families free from all alcoholic influence, and living very temperate lives as far as alcoholic drinks were concerned: Only 5 out of their direct descendants of 61 children died from diseases connected with want of vitality, and 4 children suffered in later childhood with curable affections of the nervous system. Only two children showed congenital defects. The remaining 50 children (81.9%) of the temperate were normal in condition, and during childhood, at least, showed normal further development of physical and mental powers.

Although unavoidable sources of error are connnected with this method of investigation, still a comparison of such results is valuable for the subject which we are considering. The sad truth which results from our investigation is that among the children of drunkards the mortality is alarming, that the survivors present a little heap of sufferers of unsound mind, of idiots,[66] epileptics, and those otherwise affected in their nervous system, and that only a very small proportion of such offspring ripen into useful members of the community. Besides, this sad story of human suffering also shows with certainty that drunkenness is hereditary, and that it trans-

mits itself from generation to generation until there is final extinction of the defective race.

Fortunately—we must mention this to prevent a misunderstanding—this sort of alcoholic degeneration of entire families and of single young individuals, is rather rare, in proportion to the number of our population. The Berne family-stock is physically and mentally healthy and strong, its child population as robust and wide-awake as that of every other well-governed country. Nevertheless, it is a question here to-day of uncovering partly hidden evils which gnaw at the root of this strong tree; evils which now threaten the healthy development of the youth of every country, and to overcome which we must all work together toward a common end.[67]

In the preceding pages we have seen the harmful influence of alcohol upon the child's organism. Permit me also briefly to allude to the medical influence of alcoholic drinks in diseases of children.

The greatest physicians of all times, from Hippocrates down to our own day, have ascribed to alcoholic drinks, especially wine, a stimulating and exciting influence. From the number of prominent clinicians and physicians of the last century we may mention, for instance, Friedrich Hoffmann,[68] Boerhave,[69] and Stoll,[70] who place great value, in their works, upon the use of wine in exciting the activity of the heart in cases of weakness. So also Christian Gottlieb Selle, the distinguished physician and teacher of the Charité, in Berlin, who lived during the end of the last century; he pronounced wine to be among the most effective stimulating medicines, and added that no apothecary should be without it. Hufeland,[71] Jahn,[72] Peter Frank.[73] and Richter[74] all praise wine as a powerful stimulant, especially in typhoid cases. The extent to which the therapeutic use of alcohol as a stimulant was carried, through the exaggerated teaching of Brown and his disciples, has already been mentioned; also its use as an excitant in typhus, in asthenic pneumonia, by the most renowned clinicians of to-day.

These well-grounded clinical experiences, more by observation at the bedside, are opposed in a certain sense to the pharmacological reports upon the particularly paralyzing influence of alcohol.

It was very likely on account of the different views that

the question of the physiological and therapeutic effect of alcohol was so thoroughly discussed at the Seventh Congress for Internal Medicine, at Wiesbaden, in 1888.[75] Binz from the pharmacological, and Von Jaksch from the clinical-therapeutic, standpoint acquitted themselves in a masterly manner, as reporters in this problem. Von Jaksch asserted, basing his views upon the improvement in a considerable number of pulse-tracings after the administering of alcohol to sick children, that the pathologically small and frequent pulse, often leading to conditions of collapse, becomes slower and fuller as the result of alcoholic influence. Thus, when in childhood it is a question of rapid loss of strength and suddenly appearing heart-failure—as in the acute feverish diseases occurs especially in diphtheria, scarlet fever, measles, typhus, acute enteritis of infants, the so-called cholera æstiva,[76] finally in sudden severe loss of blood after injuries—alcohol, in the form of cognac or wine, may be life-saving.

Von Schmiedeberg[77] tried to explain away these clinical results "of the vivifying influence of alcohol" with reference to the above-mentioned pharmacological view "of the particularly paralyzing influence of alcohol" by the theory that possibly a spasm of the blood-vessles which opposes a great obstacle to the evacuation of the heart is removed by the wine,[78] or the distribution of the blood in general is altered and improved. In other cases it may be a question of the diminution of the too strong tone of the inhibitory nerves of the heart, or of the mitigation of an irritated condition of the motor ganglions of the heart, which render its pulsation superficial and too frequent.

As a second therapeutic influence of alcoholic drinks, the investigations of Binz and Jaksch, and the earlier observations made by Binz and his disciples, establish the fact that in total abstinence from food, also in acute and chronic diseases, alcohol may serve as a food which the tissues may consume, and in this sense also as a respiratory food.

When alcoholic drinks are used for this last purpose, or for the more important purpose of serving as a natural and vivifying remedy for the sick child, it must be a fixed rule that this be done only at the order and under the supervision of the physician, in order that large, nervous-system paralyzing, or continued harmful doses may be avoided, and that the use

of the alcohol be discontinued immediately upon the restoration of the child. We would add, based upon our personal medical experience, that it would be a pity if the battle waged so rightfully against the abuse of alcohol should lead to the suppression of the medicinal use of alcoholic drinks at the sick-bed.

Thus it is seen that the abuse of aclohol by parents falls upon their posterity even to later generations; that alcohol under certain conditions exercises a very valuable influence upon the sick child; that the use of alcoholic drinks is neither necessary nor beneficial to the healthy child, but, on the contrary, works direct harm against its development, undermining its health and prejudicing its moral education.

It may be said, in opposition, that so severe a condemnation of alcohol in childhood is based upon comparatively rare observations, and that thousands of children take moderate quantities of alcoholic drinks with impunity, at least without apparent harmful effect.

It is against exactly such an argument that this study of alcohol furnishes the best weapon. Even though the deleterious effects of alcoholic drinks in childhood do not make themselves apparent and visible in every case, they exist nevertheless; and they may show themselves in the future, if they do not do so at once.

From the standpoint of public hygiene, we should endeavor to prevent the use of alcoholics as beverages in children. It is the duty of the physician to explain these dangers to all—the rich as well as the poor—and to caution them against the evils which follow the early use of alcoholic drinks. In this way we may succeed in limiting its use to an older period of life, and to remove, as far as possible, quantitative abuse.

If youth be deprived of alcoholic beverages during the period so important for the future—the period of development—there will be bodily and mental vigor and an attempt after the ideal good of mankind. Thus moral vigor and strength of character will result; so that, maturity being reached, no external restraint or force will be necessary to limit the indulgence in spirituous beverages to quantities to which free mortals are entitled.

BIBLIOGRAPHY.

1. Bern: Stämpfli'sche Buchdruckerei, 1884.—2. 27th Annual Report, Jenner Hospital for Children; observations based upon this report, Demme, p. 79.—3. Der Alkoholismus, Berlin, 1878, p. 328.—4. Soulié: Bullet. de Thérapeutique, 1870.—5. Brit. Med. Journal, Aug. 23d, 1884; also, Arch. f. Kinderheilk., vol. vi., H. 6, 1885, p. 464.—6. Verhandlungen des VII. Congresses für innere Medicin, Wiesbaden, 1888, p. 137.—7. Ueber Alkohol-Misbrauch, Deutsche med. Wochenschrift, 1888, No. 47; Bunge: Die Alkoholfrage, Leipsic, 1887.—8. Alkohol-Congress, Christiania, Sept., 1890.—9. Kayser: Ein Beitrag zur Alkoholfrage, Inaug. Dissert. Kiel, 1888, p. 11.—10. Compare Lissauer: Ueber den Alkoholgehalt des Bieres; Berliner kl. Wochenschrift, 1865, p. 348.—11. Compare observations based upon 27th Ann. Report of Jenner Hospital for Children, pp. 70, 71, 79 and following.—12. Dogiel: Pflüger's Archiv für Anatomie und Physiologie, Bd. 8, 1874, p. 604 u. ff.—13. Parkes and Richardson in Baer, op. c., p. 28.—14. Kretschy: Beobachtungen und Versuche an einer Magenfistelkranken; Deutsches Archiv f. klin. Med., 1876, H. 6; compare Baer, l. c., p. 37.—15. Fokker, Obernier, Rabuteau, Zülzer, Strübing (compare Nothnagel und Rossbach: Handb. der Arzneimittellehre, 6. Aufl., 1887, p. 385).—16. Compare Schmiedeberg: Grundriss der Arzneimittellehre, 2. Aufl., 1888, p. 16 u. ff.—17. Compare observations based upon the 27th Annual Report of Jenner Hospital for Children, Demme, p. 85 and following.—18. Binz: Vorles. über Pharmakolog., 1884, ii. Abth., p. 372.—19. Bunge: Die Alkoholfrage, Leipsic, 1887, p. 8.—20. Compare Sonderegger: Vorposten der Gesundheitspflege, 3. Aufl., p. 193.—21. Loc. cit., p. 364.—22. Loc. cit., p. 744 u. ff.—23. See observations based upon the 22d An. Report of the Jenner Hospital for Children, p. 49 and following.—24. Experiments, Pharmakologisches Institut.—25. Observations, 27th An. Report Jenner Hosp. for Children, Demme, pp. 70 and 71.—26. Observations, 22d and 27th An. Report Jenner Hosp. for Children, Demme, pp. 58, 60, 62, 85.—27. Observations, 22d and 27th An. Report Jenner Hosp. for Children, Demme, p. 65.—28. Observations, 27th Annual Report Jenner Hosp. for Children, Demme, pp. 73, 75 et seq.—29. Observations, 22d and 27th Annual Report Jenner Hosp. for Children, Demme, pp. 60, 61, 85.—30. Alcoholic Drinks as an Article of Diet for Nursing Mothers, Med. Temp. Journal, 1870, p. 146; also, Observations on 27th Annual Report of Jenner Hosp. for Children, Demme, p. 83.—31. Observations 27th Annual Report, Jenner Hospital for Children, Demme, p. 83 et seq.—32. Observations, 27th An. Report Jenner Hosp. for Children, Demme, p. 84 et seq.—33. Bulletin de la Soc. Française de Tempér, 1889, 2 Série, t. x., Nos. 3 and 4, p. 142.—34. Descendenz und Pathologie, Virchow's Archiv, Bd. 103, H. 1.—35. Das Variiren der Thiere und Pflanzen im Zustande der Domestication, Stuttgart, 1868.—36. Natürliche Schöpfungsgeschichte.—37. Das Problem der Befruchtung und der Isotropie des Eies, eine Theorie der Vererbung, Jena, 1884; also, Welchen Ein-

fluss übt die Schwerkraft auf die Theilung der Zellen, Jena, 1884.—38. La Maturation de l'Œuf, Bullet. de l'Academy royale de Belgique, 2 Série, t. xl., 1879 and 1883.—39. Ueber Befruchtung und Zelltheilung, 1878; Neue Untersuchungen über den Befruchtungsvorgang, etc., Jena, 1884.—40. Ueber die Vererbung, Jena, 1883. Ueber Leben und Tod, Jena, 1884. Die Continuität des Keimplasma's als Grundlage einer Theorie der Vererbung, Jena, 1885; Zur Frage nach der Vererbung erworbener Eigenschaften, Biol. Centr.-Bl., 1886, vi., No. 2.—41. Die Bedeutung der Zellkerne für die Vorgänge der Vererbung, Zeitsch. f. wissensch. Zoölogie, xlii.—42. Zellsubstanz, Kern und Zelltheilung, Leipsic, 1882.—43. Können erworbene pathologische Eigenschaften vererbt werden und wie entstehen erbliche Krankheiten und Missbildungen? Beitrag zur Anat. und Physiol., Jena, 1886, Bd. i., H. 2 und 3, p. 363 u. ff. —44. Statist. Unters. über Geisteskrankheiten, 1876.—45. Wiener Med. Wochensch., 1887.—46. Die Alkohol. Geisteskrankheiten im Basler Irrenhause aus den Jahren 1876–78. Inaug. Dissert.—47. Rechenschaftsbericht über die Irrenanstalt Burghölzli für das Jahr 1880, Zurich, 1881; compare Ziegler, l. c., p. 386.—48. Observations, 22d Annual Report Jenner Hosp. for Children, Demme, p. 63.—49. Paris, 1847, t. i., p. 476 et seq.—50. Op. cit., p. 269; Legrain: Hérédité et Alcoholisme, Paris, 1889; Grenier: Contributions à l'Étude de la Descendance des Alcoholiques, Thèse, Paris, 1887.—51. Der Irrsinn im Kindesalter; Autorisirte Deutsch. Uebersetzung von Dr. Galatti, Stuttgart, Enke, 1889, p. 195 u. ff.—52. Ibid.—53. Observations, 27th An. Rep. Jenner Hosp. for Children, Demme, p. 78 and 87.—54. Proceedings of the First Meeting of the Amer. Assoc. for the Cure of Inebriates, Phila., 1871, p. 25.—55. Chron. Alkohol-Krankheit, etc., von Dr. M. Huss, aus dem Schwed. übersetzt von Gerhard v. d. Busch, Stockholm und Leipsic, 1852.—56. Observations, 27th An. Rep. Jenner Hosp. for Children, Demme, p. 81.—57. Baer, op. c., p. 271.—58. Der Missbrauch geistiger Getränke, Tübingen, 1839, p. 107.—59. Op. cit.—60. Ziele und Zwecke der Psychiatrie. Antritts-Rede, Zurich, 1876, p. 15.—61. Baer: Op. cit., p. 274.—62. Bern, 1874, bei Koerber, p. 2 u. ff.—63. Observations, 27th An. Rep. Jenner Hosp. for Children, Demme, pp. 71, 72.—64. Same, p. 77 et seq.—65. Same, p. 81. Both children died in 1890, one from diphtheria, the other from pneumonia.—66. Same, p. 72 et seq.—67. Same, p. 88.—68. Gründlicher Unterricht u. s. w., herausgegeben von Reimann, Ulm, 1745, p. 109.—69. Consultationes Medic., Göttingen, 1752, pp. 59, 91 u. ff. —70. Aphorismi de Febribus, Viennæ, 1785.—71. Ueber die Kriegspest, Berlin, 1814.—72. Praktische Materia Medica, Erfurt, 1818.—73. De Curandis hominum morbis, liber primus, de febribus, i., 84, et iii., 31, Wien, 1832.—74. Ausführliche Arzneilehre, Bd. 3, p. 212, 1832.—75. Verhandlungen des VII. Congresses für innere Medicin, Wiesbaden, 1888, p. 70 u. ff.—76. Ueber die Zweckmässigkeit der frühzeitigen therapeutischen Anwendung des Alcohols, 16th Jahresbericht, Jenner Hosp., Demme; also, 27th Jahresbericht, p. 67 und 68.—77. Loc. cit., p. 27.—78. Durch die lähmende Wirkung der Weinbestandtheile auf die Gefässnerven.

THE

DISEASES OF DEVELOPMENT

BY

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THE

DISEASES OF DEVELOPMENT.

THE development of a child does not always present an unbroken progress; there may be sudden variations in its course which are injurious in their influence upon the subject's health; in other words, there are certain diseases which deserve the name of diseases of development, and these I propose to study in their principal clinical expressions.

I do not desire to exhaust the subject of anomalies of growth from the birth of the infant until it reaches maturity, but merely to report the substance of a series of observations which I have been collecting for the last seven years at the dispensary of the Philanthropic Society.

I shall describe the child's development only during its period of greatest activity, which, as is well known, occurs during its second infancy and reaches its maximum between the ages of twelve and fifteen. It is at this time that the process of growth presents its greatest interest and most extensive morbid manifestations.

The fact that a child suffers from a disease at a period when it is growing most rapidly does not necessarily prove that the relation between the malady and the development is causal, for in order to deserve the name of developmental disease this relation must be one of more than simple coincidence.

When we endeavor to establish such a consequence we often fail to discover the connection, for the maladies of growth are far from being common, even in surroundings which appear favorable to their development.

In the last seven years I have studied the diseases of nearly 40,000 children in the faubourg of Villette, and from these observations have reached the following conclusions as to the relation between development and disease. The patho-

genic influence of growth has frequently been exaggerated; for while it is beyond all question in certain cases, it nevertheless plays but a restricted part in the entire field of the disease peculiar to children.

I. Exaggerated Development, Under the Influence of Environment and Disease.

Among the children whom we have to treat during their period of growth, some are predisposed to disease by defective hygienic surroundings, others by inherited taint.

A child which is placed in the best conditions and furnished with a sufficient amount of pure air and proper nourishment and exercise, passes the limit between infancy and puberty without effort or danger by an imperceptible transition. It develops with physiological regularity, gaining from five to six centimetres in height every year, and attaining maturity without paying tribute to the pathology of childhood. This little peasant may undergo a sudden access of growth which is two or three times the usual yearly increase without suffering from it: a child brought up in the city, surrounded by less favorable conditions of hygiene, is far more exposed to accidents in its development.

The following two cases of young girls of the same age, the one brought up in the country (Case I.) and the other in a quarter of Paris (Case II.), demonstrate the truth of the latter statement:

Case I.—Girl, æt. 12, of rapid growth in the country, no accidents (August 24th, 1888). Present condition, vigorous, fat, of large size, has a slight impetigo of the face; mother says she has grown a head every year; no morbid signs whatever.

Case II.—Girl, æt. 12½, rapid growth in Paris (August 20th, 1888). As large as the other, but without her fat and strength. Mother states that she has grown fifteen centimetres in one year; has become feeble, suffers from pains in the head, flushing, faintness, and syncope at times, intercostal neuralgia, general nervousness, anæsthesia of the pharynx; no heredity.

These two short observations furnish the basis of the thesis which I shall endeavor to demonstrate.

Is it strange that the poor little city child, who lacks air, aliment, and exercise, who suffers from improper physiological and social conditions, should be exposed in large measure to diseases in the course of its growth? Does not the scholar who is condemned to a sedentary life, although not to the improper hygiene, find himself in an analogous state of malnutrition?[1]

Without insisting on the pathogenic influence of the environment, I pass to that of disease which has been recognized for a long time.

Auboyer, in his work upon the subject,[2] gives some interesting historical information. Haller, in the last century, speaks of a young girl who attained an enormous size at the termination of a fever. Van Swieten, in his commentaries, cites cases of children who presented a rapid increase in size following variola. Buchner (Halle Dissert., 1752) has seen similar cases. To these authors we may add the names of Nysten, Rullier, Bégin, Bouchut, Rilliet and Barthez, Bouchard, and others.

Of all the acute diseases, typhoid fever appears to have the most evident influence upon the increase in the size of the bones. The horizontal position to which the patient is condemned for many weeks or months removes the reciprocal pressure of the bones, and the irritative congestion of the marrow gives rise to a proliferation of osseous tissue at the epiphyses, and thus there occurs a rapid elongation of the whole skeleton. As a consequence of this disease, we therefore see a child increase from ten to fifteen centimetres in the space of a few months. This growth is at times so rapid, especially at the lower epiphyses of the femur, that the integument of the part presents the white lines so familiar on the abdomen of the pregnant woman and thus bears witness to the extreme elongation of the skeleton and the inability of the skin to keep pace with it.

This phenomenon of development has been well described by Bouchard and a number of other observers, not only as a sequel of typhoid, but also after many other acute and chronic diseases.[3] The seat of the lines so produced is most often on the extensor surfaces of the knees and elbows, and they are directed transversely and are indelible.

With this rapid *résumé* of the hygienic and pathological

conditions which influence development, I pass to the study of the chief diseases of the period of growth.

II. Morbid Conditions which Result from Growth.

Before describing the diseases which directly result from growth, I shall briefly recapitulate the maladies to which it predisposes.

It is generally admitted that the enfeeblement which follows from exaggerated growth predisposes the child to infectious diseases, and especially to the three great infections which attack the young of our large cities with such exreme severity; namely, tuberculosis, typhoid fever, and acute osteo-myelitis.

In the case of phthisis the predisposing action of this period is undoubted; it is admitted by Bouchard, whom I have already cited, and by Lancereaux, who stated before the Academy of Medicine on July 19th, 1887, that "Rapid and extreme growth of the body, especially about the age of fifteen to eighteen, is a circumstance which in all conditions of life predisposes to the development of pulmonary phthisis, most evidently in persons whose alimentation is defective."

The mere fact of growth does not of course create the microbes of tuberculosis, typhoid, and osteo-myelitis, but the organic deterioration which it causes renders the child more vulnerable and places it in a condition where it is no longer capable of resisting the invasion of the micro-organisms which are always present in its food and the environment of cities.

The relation between growth and osteo-myelitis is so well established that it may be traced in the names and surgical definitions of the authorities; *e.g.*, "the fever of adolescence" (Richet), "acute osteo-myelitis during the period of growth" (Lannelongue), etc.

The starting-point of the osteo-myelitis, as Lannelongue insists, is to be found at the epiphyseal cartilages of the long bones; that is to say, at the point where there is the greatest formative activity in the marrow. This evidently forms a locus minoris resistentiæ, which invites the disease and prepares the field for it; if with the condition of receptivity we have also a lesion of the integument, either external or on the mucous surfaces, forming a point of entry, the staphylococcus enters the scene and begins its activity.

Besides the diseases which are directly due to the predisposing influences of the period, there are others where the relation is more obscure. The diseases of development may be divided into three groups, according to the organic system which bears the brunt of the attack; into diseases of the osseous, the circulatory, and the nervous systems.

1. *Diseases of the Osseous System.*

The seat of the increase in length is found in the bones, and especially in their epiphyses; it is therefore in the neighborhood of the epiphyses that we seek for the characteristic manifestations of such increase.

At times there is no appreciable change in the form or the volume of the bones, but the child suffers either spontaneously or on walking or from the application of pressure; osteocopic pains are the most frequent phenomena. These vague pains, often difficult to localize, involve the whole of the lower extremities because they suffer the weight of the body and the fatigue of walking. The child is frequently unable to indicate the seat of the pain which it evidently feels. An attentive examination will demonstrate that the pain is most violent at the epiphyses, and especially in the region of the epiphyseal cartilages. With these painful points, which Bouilly [4] has so well described, there is apt to be also an intense febrile movement with marked crises; and if the patient has been measured both before and afterward, there is found to be an increase in its height of one centimetre to one and one-half centimetres.

According to Bouilly, there are other cases where the fever is the chief symptom and the pains are subordinate or absent. This is a juxta-epiphyseal osteitis of very mild grade, still called the fever of growth, which I have never had the opportunity to observe.

The following are cases of intense growth-pains such as are frequently met with in the clinic:

Case III.—Girl, æt. 12 years, rapid growth, general feebleness, pains in the head and lower limbs. Present condition, child too large for her age, had sudden increase in size two years ago after typhoid, no integumental lines; in six months (November, 1887, to May, 1888) has grown fourteen centimetres; is pale, agitated, nervous, has no appetite; for three

months has had malaise, frontal headache, pain in legs occupying whole length of tibiæ, without predominating at the epiphyses. Many months' treatment with cold baths (douches) and iron; general condition improved and the patient ceased to suffer.

Case IV.—Girl, æt. 11 years, very rapid growth, pains in limbs, dyspepsia, and anæmia. Admitted November 9th, 1887, very pale, thin, ate little, and suffered pain in the stomach after eating, sleep disturbed by dreams; with the dyspepsia, marked anæmia, with bruit in the neck; pain in the tibiæ, without deformity, not especially marked at the epiphyses; all these symptoms after sudden increase in height not measured by parents but probably considerable. Iron, cold douches; cure.

Case V.—Girl, æt. 7 years, rapid growth, gastralgia, pain in legs and knees. First seen May 28th, 1888; had complained for fifteen days of pains in legs and knees, not worse on pressure; no deformities; rapid growth for several months; patient pale, but no murmur in great vessels. Treatment as above.

Case VI.—Girl, æt. 5½ years, rapid growth, pain in legs. First seen August 27th, 1888; had grown five centimetres in three months; has become pale and thin; appetite failed; complains of pain in head and legs; seat of latter not determined, as child was too weak to stand. Treatment as above.

Case VII.—Girl, æt. 6 years, rapid growth, pain in legs, frequent falls. Seen June 27th, 1887; has grown rapidly for six months, has become very feeble, complains of pain in tibial shafts; as result of which, falls so frequently that the knees are ecchymosed.

From these cases, which might be multiplied, we see that the clinical picture lacks distinctness; but the vague nature of the pains, the neurotic condition of the patients, the sex (for girls are far more often affected than boys), justify us in grouping such cases under the category of the nervous affections of development.

On the other hand, there is a disease of the bones which clearly and directly depends on the process of growth; namely, the developmental exostoses described by Broca and his pupils. Among the latter, Soulier has demonstrated anew the

pathogeny of these exostoses and the parallelism between them and the general development of the skeleton,[5] and shown that they are due to a hypergenesis of bone from deviations in the epiphyseal cartilages.

These bony tumors are found most constantly at the lower extremity of the femur on its internal surface, the superior end of the humerus, the superior end of the tibia and fibula, and the lower ends of the bones of the forearm; in other words, in those situations where the increase in the length of the long bones takes place. "Derived from the epiphyseal cartilages," says Follin,[6] "where the process of ossification is most active, the elongation most rapid, and the cartilage most thick, these exostoses are found chiefly at the extremities of the long bones and especially where their growth is the greatest."

These exostoses, which may be multiple, develop especially between the ages of eleven and twenty years, and are more frequent among boys; they are both the effect and the evidence of exaggerated processes of growth.

The following is a case which I have studied for many years, remarkable for the seat of the tumor and the excessive growth of the patient:

Case VIII.—Boy, æt. 16½ years, general condition always good, in spite of the rapidity and the exaggeration of his development; voluminous exostoses on the right iliac bone. Case under observation for many years, ending in December, 1888. Thin, delicate, poorly nourished during infancy; began to develop at the age of twelve years, after scarlatina; now measures 1 m. 82 cm.; father's height, 1 m. 73 cm.; mother's, average. This increase in height is equally marked in other measurements; child very robust, and muscular system in keeping with the skeleton. Actual gain in size during the three years cannot be estimated, but it is certain that at twelve his height was only average (was 1 m. 80 cm. at fifteen years), and therefore had gained about 25 or 30 cm. in three years. General health good in spite of this excessive growth. Placed in the Lyceum at Paris, our subject, who is intelligent, never took a high rank; preferred physical exercise to lessons. Appetite always formidable, with a preference for fatty things, such as butter and greasy meats.

For the last three years a bony tumor has been forming on the right iliac bone, at its upper and exterior part near the crest, equidistant from the sacro-iliac articulation and the anterior superior spine; at first of small size, later of the volume of an egg. This has developed without pain or inflammatory reaction, insidiously. Now a hard mass, oval in shape, six centimetres in the horizontal diameter and three centimetres in the vertical; surface rough and unequal; base large and sessile, joined with the iliac bone; without pain on pressure and not adherent to the skin. No other formation of a similar nature discoverable.

Treatment with iodides, etc., has had no effect; tumor stationary in its growth for a long time.

Absence of other tumors or morbid manifestations to be explained by the fact that there has been no fault in his alimentation. His condition is comparable to that of race horses which attain the size of a four-year-old in two years by proper aliment and exercise. But in these horses, exostoses may develop under the influence of super-alimentation, especially if exercise is neglected.

It is then probable that, if our patient had passed his life in the country, he would not have had any such tumor form.

These tumors of development, according to Gosselin, are found also under the nails of certain patients from the fifteenth to the eighteenth year.

Before treating of the osteitis of development, we must first describe the tarsalgia of youth, which, however obscure its pathogeny may be, certainly occurs at the period of greatest growth, between twelve and eighteen years. This affection attacks those who are exposed to severe labors, such as prolonged standing or forced marches. It seems to result from the discrepancy between the work demanded of the too young and weak muscles and bones and the weight of the body, which is abnormally increased by its heavy tasks. While the theory of Gosselin may be true, that there is either a dry arthritis of the tarsus or an insufficiency of the peroneus longus (Duchenne), the influence of development must be accepted in each instance. The following is an example of this affection:

Case IX.—Girl, æt. 13 years, rapid growth, flat foot, and slight tarsalgia. Seen first, September 26th, 1888. Of fair appearance, has not menstruated, has grown fast for the last few months, and is as large as her sister who has passed her fifteenth year. Has had pain in the feet for several weeks, on the dorsal surface, at the tarso-metatarsal joint of the second toe; the pain is much worse on pressure and when the patient executes movements of torsion; symmetry perfect, no swelling or redness of the skin. Torsion of the foot is attended with dry crepitus. The plantar arch is effaced and the foot is very flat. Patient belongs to a large family of laborers and has always helped her mother with the work. Under complete repose and iodine dressings the pain disappeared.

The existence of arthralgias in a child's development is admitted by many physicians; I have already cited Gosselin, whose name carries authority. Brouardel[7] expresses the following opinion on the point: "Growth is frequently asymmetrical in the various portions of the body; the bust alone may enlarge, while the lower extremities fail to elongate; in other cases the feet suffer no arrest of development; in still others, they are the only part affected, the tibio-tarsal surfaces do not have their normal relations, and painful arthralgia results."

Brouardel is therefore inclined to enlarge the importance of the arthralgia of development, and include the tibio tarsal articulation among the parts affected.

As regards in-growing nails, so frequent among youth, the same may be said which applies to tarsalgia; it is an affection which is connected with development, although indirectly. On the one hand, the child increases in size; and on the other, we have efforts of walking in improperly made shoes: these are the two elements in the case.

Besides the tarsalgias, which especially attack the youth of the poorer classes, who are prematurely obliged to work too hard, we meet with deformities of the vertebral column; scolioses, which affect the young of both sexes in every condition of life where the sedentary habits of the student compel one to maintain vicious attitudes for long periods of time. Here the development of the skeleton is certainly not the only cause, for the action of the muscles may also play an important rôle.

The entire organic system, and the muscles in particular, are exposed to this developmental vulnerability. In schools and colleges the muscles develop but poorly and remain rudimentary, subject to the injurious effects of improper attitudes and inordinate zeal.[8] As a result they lose their tonicity and are unable to contend against the articular deformities which occur when the position of the subject is not frequently changed; scoliosis is due to a great extent to such muscular insufficiency, which should be prevented by systematic exercise.

Osteitis of Development.—In children who grow too rapidly, the bones in general, and the long bones of the limbs particularly, form an inviting field for the localization of morbid processes. The osteitis, periostitis, and medullitis which occur in young subjects are intimately related to their development. I do not refer to the acute osteo-myelitis of adolescence, of which I have spoken above; I wish merely to say a few words on the subject of inflammations and suppuration in the osseous tissues of the young, frequently induced by traumatic or morbid influences.

Surgeons know[9] that a traumatism of very slight importance in a child may serve as the starting-point of an acute or chronic osteitis; the same results are observed after immoderate and fatiguing exercise or work. In these cases, as always, the inflammation localizes itself by preference at the points where the physiological processes are the most active; namely, at the epiphyseal cartilage, in the medulla, and under the periosteum.

Severe fevers such as typhoid and scarlatina have the same effects as traumatism. Bouchard clearly appreciates the combined influence of growth and typhoid fever on the production of osseous inflammations in young subjects.[10] "Typhoid," he says, "produces an irritable condition of the medulla of the bones, as Neumann and Ponfick have demonstrated; the same is true of normal growth. In the case of typhoid in a young person we have therefore a twofold explanation of the formative activity in the medulla of the bones; during convalescence it is not uncommon to see a developmental osteitis supervene which is only the exaggerated form of a process normally without manifestations. It is then that we observe the pains in the epiphyses, often running the length of the

bone, increased by pressure and the effort of standing, which create a veritable condition of impotence which may last for weeks, and which by their intensity and their chief location may lead one to suppose that the attack is one of acute articular rheumatism; the error is rendered even more probable by the tumefaction of the parts which is often present. All the bones of the extremities may be affected; the vertebræ and the bones of the cranium and the face may also be involved, so that headache is an almost constant symptom of osteitis in the young."

Without denying the fidelity of the clinical picture presented by Bouchard, I cannot agree with him in his interpretation of the pains in the bones; the term "osteitis" seems to me inapplicable to phenomena which are often so fugitive and superficial. I have at times met with a slight degree of veritable osteitis, of both epiphysis and apophysis, in certain infants. I still have under my care a girl of eleven and one-half years who has grown too rapidly and who complains of feebleness of the legs and pain in the knees. The two tibial tuberosities are swollen and painful on pressure. This apophyseal osteitis yielded to prolonged repose; neglected, it might end in suppuration.

2. *Diseases of the Circulatory System.*

Although the exaggeration of the process of growth influences the bones primarily and especially, and the pathology of development concerns lesions of the skeleton chiefly, still it is none the less true that the circulatory system may also be involved indirectly.

Why should the circulatory apparatus escape the consequences of excessive growth and the general enfeeblement which results therefrom? Almost all diseases affect the heart secondarily, and those which are characteristic of development are no exception to the rule.

It is quite common to observe crises of palpitation, accompanied with pain, occurring in young girls and boys, either spontaneously or after slight efforts and fatigues.

Such palpitation is characterized by increased force and frequency in the pulsations of the heart, anguish and dyspnœa at times, and entire absence of appreciable cardiac lesion. The

præcordial dulness is not increased, there is no murmur to suggest valvular disturbance, and there is no deviation of the apex; at times, however, an arhythmic note or a false beat interferes with the heart's pulsation.

I have said that such palpitation occurs especially in young girls; I might add that the nervous and anæmic are more exposed than others.

The influence of fatigue is easily understood. A child who has grown up too quickly easily tires; and if it tries to engage in the play and exercise of its companions, it is soon compelled to desist on account of shortness of breath and palpitation; the heart beats too fast, the breathing becomes accelerated and difficult, and the condition of the patient is serious according to the length of time involved and the rapidity of the heart's action.

Of two children of the same age, the one strong and in good condition and the other weakened by excessive growth, the former will endure fatigue say for ten minutes, but the latter is exhausted in from a fifth to a tenth of the time; that is, one has less power of resistance than the other, and cannot engage in pursuits appropriate to his age without serious inconvenience. Thus, in schools we see the weaker children take themselves away to solitary places and join the common games only with great reluctance.

If such persons are obliged to compete with their comrades, they develop the "irritable heart" which army doctors have had occasion to study in young soldiers.

The following cases relate to simple palpitation, without permanent lesion, in youth enfeebled by growth:

Case X.—Girl, æt. 13½ years, excess of growth, headache and palpitation. First seen, November 19th, 1888; very large for her age; has grown rapidly, especially in the last year—ten centimetres in a few months; father and mother dead of consumption. For the last year has had frontal headache, which persists, although the child has been taken out of school, apprenticed to a laundress, and not allowed to read or write. For some time has had palpitation with some pain; examination of the heart reveals no lesion, apex behind fifth rib, no murmur at apex or in neck. Child not anæmic, eats and digests well; has not menstruated. Is nervous, without ner-

vous antecedents; pharyngeal reflex absent, cutaneous sensibility dulled. Treatment by cold douches and bromide of potash cured the palpitation.

Case XI.—Boy, æt. 11½ years, excessive growth, headache and palpitation without hypertrophy of the heart. First seen November 7th, 1888; of medium height, thin and pale, no murmur in the vessels of the neck. History of sudden growth, which had greatly enfeebled him. Complains of constant frontal headache for several months, especially after fatigue of body or brain. Eyes normal, accommodation good. Palpitations, but no murmur, rhythm good, apex in fourth space; no valvular lesion or hypertrophy. Cough for a few days; a few scattered sibilant râles on auscultation. Parents and two older sisters in good health Treatment by cod-liver oil, fresh air, and exercise; studies forbidden.

Case XII.—Girl, æt. 14 years, non-menstruant. Excessive growth after typhoid. Palpitation, headache, dyspepsia. First seen May 9th, 1888. Ten months before, had typhoid lasting three months, after which she grew nearly fifteen centimetres, and became very feeble; extreme languor and apathy and constant headache. Appetite poor, constipation, incessant eructation. Palpitation frequent but no murmur, præcordial or cervical; apex in fourth space. Treatment, cold douches, iron, laxatives, and milk diet.

To these cases I could add many others, but it is not necessary to multiply them. For the seven years during which I have been studying the relation between growth and cardiac troubles, I have never seen the latter dependent upon appreciable lesion.

In 1885 Prof. Germain Sée presented to the Institute cases of cardiac hypertrophy resulting from development, asserting that he had encountered it about eighty times, and that it was characterized by palpitation, a systolic murmur, arhythmic action, and depression of the apex to the sixth or even the eighth space. It is astonishing that this colossal lesion has escaped the notice of physicians who see many cases of infantile disease. In the last edition of his "Treatise on Cardiac Diseases," C. Paul admits the existence of palpitation due to development, but not of hypertrophy, and demands that Professor Sée publish his methods of measuring the cardiac area.

I do not pretend to be able to decide the question, but consider it still an open one, and that cardiac hypertrophy resulting from development deserves further investigation.

Circulatory troubles in the growing child appear as palpitation, more or less frequent and painful, often accompanied by cardiac dyspnœa, and are coincident with their nervousness and anæmia.

The anæmia, of which I will not give a complete description and of which the palpitations are the effect, is itself the consequence of the rapid growth; due to the general impoverishment of the system which results from imperfect assimilation, anorexia, and antecedent diseases. It reaches a high degree at times and is accompanied by the vascular murmurs described by Bouillaud. Ordinarily it is not so pronounced and the cervical murmur is lacking, but the pallor, loss of flesh, and general feebleness betray it. With this anæmia there may also be purpura (Case XVIII.), epistaxis (Cases XVI. and XVII.), dyspepsia, etc.

True cholorosis should not be described as one of the diseases of development, but it is often closely connected with the processes of growth, which, by enfeebling the organism, favor the appearance of the most varied symptoms. Of this the following cases are demonstrative:

Case XIII.—Girl, æt. 13 years, rapid growth, palpitation, anæmia, dyspepsia. First seen August 29th, 1888. In the course of a few weeks had become thin, pale, dyspeptic, with pain in the stomach and vomiting, suffering also from frontal headache, extreme lassitude, palpitation of the heart and dyspnœa on slight exertion: there was no murmur in the neck; the pharyngeal reflex was lost. In the last six months had grown ten centimetres. Had not menstruated. Treated with iron and cold douches.

Case XIV.—Girl, æt. 13 years, rapid growth, anæmia, headache, cervical bruit. Patient had not yet menstruated, was very large, had grown twenty centimetres in a year. Is pale, with mucous surfaces colorless, and has a continuous bruit in the neck. The least effort causes dyspnœa without palpitation; heart normal. Appetite very irregular. Child somewhat nervous. Frontal headache almost constant; no eye trouble. Headache persists, although patient has left school

and given up all brain work. Treatment: quiet, cold douches, and good regimen.

Case XV.—Girl, æt. 14 years, rapid growth, chloro-anæmia, palpitation. Seen September 21st, 1888. Very large, not menstruating, extremely pale. Suffers from dyspepsia with pain in the stomach, headache, dyspnœa, and palpitation on the least effort. The heart beats rapidly but without intermission or murmur; apex at fifth rib. Bruit in cervical vessels; no nervousness or anæsthsia. This anæmia coincides with a sudden increase in height—ten centimetres in six months. Treatment, cold douches, syr. ferri iod.: rapid improvement.

Case XVI.—Boy, æt. 13 years, very rapid growth, headache, feebleness, epistaxis. May 25th, 1888. Child had grown a head in one year, according to his mother, and consequently had become dull, without energy or force. Constant frontal headache; repeated epistaxis for five or six months, not very abundant, occurring at night; no lesion in the nasal fossæ. Appetite poor. Treatment, cold douches, iron, moderate exercise; cure.

Case XVII.—Girl, æt. 7½ years, rapid growth after typhoid fever, loss of flesh, headache, epistaxis. May 16th, 1888. Patient left Paris for the country eight months ago; two days after her arrival was taken with typhoid fever; in bed six weeks. After convalescence returned to Paris, became very pale and thin, for a week had repeated epistaxis, which enfeebled her still more; no lesion in nasal fossæ. Under cold douches the bleeding stopped.

Case XVIII.—Girl, æt. 6½ years, rapid growth, purpura simplex. February 20th, 1888. Patient has grown very fast in last months; for a week has had pain in the lower limbs, not exactly localized. On legs and thighs there are numerous spots varying from small red points to large ecchymoses; no epistaxis or other hemorrhages. Treatment: sulphur baths, iron, followed by cure.

The circulatory troubles produced by the process of development are not always clearly defined, as is evident from the above, nor is their relation to the patient's growth clear in all cases. The doubtful elements are chiefly the neurotic and various other pathogenic influences which complicate the case; but in practice the error is not productive of serious re-

sults, for whatever the rôle of the process of growth, the treatment is always the same.

This treatment consists in increasing the powers of the subject, combating the anæmia, and regulating the action of the nervous system. Hydrotherapy (cold douches), iron, stimulation to the skin, physical exercise, and a good hygiene are the principal means at our disposal for effecting a cure.

3. *Diseases of the Nervous System.*

The nervous manifestations which result from the process of development are many and varied, often also ill defined and vague. Among them are chorea and hysteria, but it does not cause the neuroses which are latent in the offspring of the neuropathic and which only a fitting occasion is necessary to reveal.

In a child which has no hereditary nervous tendencies, its development may be attended with feebleness, anæmia, osseous pains, and exostoses; but in a child of nervous parents, the anomalies produced are also nervous.

The Headache of Youth.—In the front rank of the nervous troubles of development I would put headache, of which I have already reported many cases. René Blache has published a monograph on this subject,[11] embodying the results of his observations; he finds that headache resulting from rapid growth occurs from the twelfth to the eighteenth year and chiefly in children of a nervous heredity; the pain is ordinarily frontal and arises after efforts of body or brain. The patient becomes nervous, irritable, and incapable of any intellectual pursuits. The duration of the disease is never less than six months, but often the pains last fifteen months to two or three years.

Maurice Perrin discovered that these headaches were often coincident with errors of refraction, and therefore supposed that the first were caused by the latter; according to him, in the immense majority of cases the accommodative asthenopia is the only cause of these headaches of development, and to cure them it was necessary merely to fit the children with proper glasses. Cases XIX. appears to favor this theory, but I have seen many which opposed it.

In the cases which I have cited, dyspepsia is often associ-

ated with the headaches, and it is natural to inquire whether the atony and dilatation of the stomach, and the abuse of food and drink, may not play an important part in their production. The question is complex and admits of several interpretations. Development alone is maintained by Blache; Perrin cites the asthenopia; I have mentioned the dyspepsia; the anæmia and nervousness of these patients might be called into account; and, finally, Sée refers it to the cardiac hypertrophy which results from the process of growth: "It is a headache of development, but indirectly: it is rather cardiac hypertrophy of growth with headache; characterized by continuous frontal headache, which is constantly renewed after any brain work, often disappearing completely after repose, but only to return, frequently for months without a break. It is different from migraine in that it is not a hemicrania nor connected with the organ of sight nor followed by vomiting; it is the cardiac headache of development, and is observed especially during the period of life devoted to education; that is, between thirteen and twenty, and is apparently caused by the zeal of the child for its work, but at other times by the least effort of attention on the part of a dull scholar."

This description of Professor Sée is exact except as it brings the headache into relation with a cardiac hypertrophy which does not certainly exist.

The prognosis is grave in so far as the headache may rob the student of his most brilliant hopes and prevent all intellectual effort for months.

"Headache," says Peter,[12] "is the cry of the overtasked organ for pity, its demand for necessary rest; if it is not heeded, the brain refuses to perform its function. After the cephalalgia alone, comes the cephalalgia comitata, with epistaxis and fever; another degree is found in typhoid, etc."

Case XIX.—Girl, æt. 14½ years, rapid growth, frontal headache with accommodative asthenopia. November 28th, 1888. Patient has menstruated irregularly for a year, during which time her size has notably increased. Similar excess of growth after typhoid at nine years, which left no cutaneous lines. Complains of almost constant frontal headache, for which she has left school for a year. During the same time has had accommodative asthenopia. Is nervous, pharyngeal

reflex absent, sensibility of skin good. Treatment, cold douches and electricity every day.

After this case, which seems to prove the connection between the eyes and the headache, the following is of interest as displaying its relation with dyspepsia:

Case XX.—Girl, æt. 11 years, rapid growth, dyspepsia, headache. August 27th, 1888. Patient thin, complains of frontal headache for a month, worse morning and evening. Appetite poor, digestion slow and painful; the dyspepsia preceded the headache. Patient has become languid, cannot walk without fatigue, and refuses all effort of body and brain. The mother ascribes it all to her growth, which has been twelve centimetres in a year. Treatment: hydrotherapy, dry friction, and iron.

Case XXI.—Girl, æt. 11 years, growth very rapid, frontal headache, dyspepsia, nervousness. September 10th, 1888. Patient has grown fifteen centimetres in the last year; before she was in good health, now is pale, thin, incapable of all effort. Complains of lassitude and lies down most of the time; is nervous, irritable, has lost her pharyngeal reflex. Mother also nervous. Patient is dyspeptic, eats little, has much pain in the stomach; drinks too much. Treatment: drinking restrained and cold douches employed.

Other Nervous Manifestations.—While the headache is the most frequent symptom, it is not the only one. In growing young girls it is commonly the case that they complain of vague pains in their limbs or in the thorax (pleurodynia), in the abdomen or the stomach (gastralgia).

These pains are often hard to locate, and sometimes take the form of extreme lassitude with a constant desire to sleep; but the patient's sleep is interrupted, agitated, full of sudden wakings, nightmare, and nocturnal terror. These phenomena are more common in children and depend on dyspepsia, being met with oftenest in those who drink too much. They are also common in children who are exhausted by their growth; for, with their dyspepsia and distaste of food, the abuse of liquids is habitual.

At the same time these children become nervous, irritable, and impatient of all rule and restraint. Some of them have

actual intercostal neuralgia, with the painful points characteristic of that affection, but the neuralgias of youth are not so acute and persistent as those of adults. Who has not been struck by the fact that herpes zoster, so painful and rebellious in adults, is often mild and painless in the child?

As to hysteria and chorea, however laborious, rapid, or exaggerated the growth of the child may be, it certainly cannot produce either of these neuroses in their entirety; but aided by heredity and individual predisposition, is it not probable that their appearance may be hastened by the process of development?

The following two cases show the relation between chorea and development:

Case XXII.—Girl, æt. 14 years, rapid growth after variola, nervous temperament, Sydenham's chorea. November 12th, 1888. Patient large and thin, has menstruated a little and badly. Always well till last spring; then discrete variola (April) and six weeks in hospital; afterward grew rapidly. Then menstruation added its disturbing influence to those of her growth; suffered from occasional headaches without dyspepsia. Always nervous like her mother, this nervousness is now increased to the point of chorea, with hesitating gait, irregular and jerky; her hands move by jerks and she cannot grasp small objects; pharyngeal reflex absent, general sensibility diminished on the left side, where the chorea is most marked. Heart action regular, apex in fifth space, no murmur; no personal or family history of rheumatism. Under bromide of potassium and cold douches the disease was about cured by the end of December.

Case XXIII.—Girl, æt. 14 years, rapid growth, menstruation for six months, chorea, no rheumatism or cardiac disease. 1886. For a year, patient has grown too rapidly; according to her father, was always nervous; mother died of tuberculosis. Lungs and heart normal, no previous rheumatism. Choreic movements of left arm for a week; in walking, the left leg is dragged. Sensibility of skin intact but pharyngeal reflex absent; frontal headache also present. Like the first, this case is one of Sydenham's chorea, developed in a girl by her growth, her nervous temperament predisposing thereto. Treatment, bromide of potassium and cold douches; cure.

I have not described all the accidents of growth; if I had I must have said more about the dyspepsia which generally accompanies the other symptoms, of the retarded menstruation and dysmenorrhœa often observed in young girls who are enfeebled by their growth, and of the engorgement of the breasts which may occur in either sex and terminates spontaneously, after a period of more or less pain, in resolution. The morbid manifestations which may be ascribed to the process of development are not always distinct and well defined; but this uncertainty belongs to the subject, and, in giving greater sharpness of detail to the picture, one must first sacrifice truth a little.

III. Prophylaxis and Treatment.

Prophylaxis borrows from hygiene its most sure and powerful weapons. We have already seen that the environment has much to do with these diseases; if it is true that the air of the city, sedentary life, insufficient nourishment, are the principal actors in the exhaustion of our young citizens, the prophylaxis has already been indicated in the simple statement. As Brouardel declared to the Academy, schools and colleges should be removed from the constraints of the city to the fields and gardens of the country, where there is an abundance of air and light. Architects should be required to fashion large halls for study, well ventilated, well exposed to air and light, which will assure to the scholars the cubic space which they so much need. And the instructors should be required to cut down their encyclopædic lists of subjects, reduce the hours of class-room work, and substitute a large proportion of out-door life and exercise.

Finally, and we must insist upon this point, nourish the subjects with some idea of the relation between their aliment and their proper bodily and mental development! A uniform bill of fare for all youth, without consideration of their various necessities, is inadmissible. Reduced to such a system, children become weak and languid or fall a prey to disease.

All children should be provided with a proper growing aliment; that is, a quantity of food whose excess an adult would be incapable of swallowing or digesting. This reasonable food cannot be measured in figures, but must be suited to

each one according to his appetite and his capabilities of digestion.

Instead of all this, we see our system making, as Richet says,[13] "scholars, not men; in great barracks where excellent lessons are given, but where the bodies of our youth are tired out and exhausted," under conditions of hygiene the most deplorable.

The ideal is directly contrary to the actual conditions, and it is unfortunately impossible to do away with them, but let us none the less apply ourselves to the correction of the dangerous abuses. The children of the rich at least, during vacations, escape the injurious consequences of our evil school system; but the children of poor citizens leave school only to share the miserable lodging of their families. The city of Paris has tried to combat the effects of this social inequality by establishing vacation colonies, and this example of a great city deserves to be proclaimed, encouraged, and imitated: it is not only a question of charity, but also a social duty, to secure the vigor of our generation, that the country shall have worthy defenders in the hour of need.

These are the main features of prophylaxis to be observed against the diseases of development.

Suppose we have a child about the age of fourteen or fifteen, suffering from overgrowth, thin, pale, and feeble, and incapable of any effort of body or mind, what shall we do? Without waiting for the appearance of any one special disease, we should begin a treatment which borrows more from hygiene than from the materia medica, prescribing repose of muscle and brain, forbidding study and house service, and, if possible, sending the patient to the free air and liberty of the country, far from the stupefying noise of the city. His food must be chosen for ease of digestion, rapidity of assimilation, and freedom from waste products. Milk, eggs, cream, vegetable soups, preserved fruits and raisins should occupy a large place in his diet, and bread, containing as it does much lime and phosphorus, should also be advised.

Gradually, consulting his tastes, fish and roast meats may be added to his diet, prepared beforehand by removing all fibrous portions. For very delicate stomachs jellies are not to be forgotten. Avoid all spiced food.

Little by little as the child loses its pains and lassitude, it

may be allowed to play and exercise, and if it has been wisely managed it will regain its vigor and healthy appearance and the crisis of its development be passed in safety.

I have as yet said nothing of medication. Wines of cinchona, gentian, colombo, coca, etc., which are so often abused in the belief that they are tonic and nutritive, are generally contra-indicated in these case. All extracts of bitter plants dissolved in a large proportion of alcohol irritate the delicate stomachs of these patients and are without effect.

For the anæmic, iron may be employed with discretion; bromides should be saved for the nervous.

Hydrotherapy, and especially the cold douche, may be applied in nearly every case. For those who cannot avail themselves of a regular establishment, cold washing followed by hot frictions every day may be advised, as well as massage, stimulating friction with camphorated alcohol, turpentine, etc. These various means may be employed singly or alternately; they have the common object of stimulating the nerve endings, increasing the circulation, aiding the action of the skin, and thus relieving the drain on the general nutrition. Salt baths and sea-bathing are also of benefit in some cases.

After an acute disease, such as typhoid fever, the care of the growing child must be redoubled. Its diet must be especially watched, and the best aliment which can be given is milk and eggs, and the best form in which to give this is as a mixture of the yolk of the egg with the milk.

These are the general features of the treatment; for the indications in the case of complicating disease, I refer to the sections which treat of these particular diseases.

BIBLIOGRAPHY.

1. Bouchard: Maladies par Ralentissement de la Nutrition, Paris, 1882, p. 36.—2. Paris thesis, 1881.—3. Soc. Clinique, Paris, Jan. 16th, 1879.—4. Rév. de Méd. et de Chir., 1879.—5. Paris thesis, 1864.—6. Traité de Pathologie Externe.—7. Acad. de Méd., Discussion sur le Surmenage, 1887.—8. Peter: Acad. de Méd., Discussion sur le Surmennage, 1887.—9. Heydenreich: Article, Osteitis in Dechambre's Dictionary.—10. Bouchard: loc. cit.—11. Les Céphalalgies de Croissance. Rev. des Malad. de l'Enfance, 1882, p. 117.—12. Acad. de Méd., June 28th, 1887.—13. Rev. Littéraire, Nov. 29th, 1886, p. 648.

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THE PRACTICE OF HYPNOTIC SUGGESTION.

"Prove all things, hold fast that which is good."

CHAPTER I.

INTRODUCTION.

HYPNOTISM is no new thing, but has in some form or other been known since the earliest times; it was practised by the Egyptians, Persians, Greeks, and Indians, and employed by priests, mystics, soothsayers, fakirs, and charlatans; it has appeared in our own country as animal magnetism, mesmerism, electro-biology, electro-psychology, and I know not by how many other titles. (Naaman is supposed to have referred to animal magnetism, so called, when he said to Elisha's messenger, "I thought, He will surely come out to me, and stand, and call on the name of the Lord his God, and strike his hand over the place, and recover the leper" [2 Kings, v. 11]. The original, I believe, might fairly be rendered, "move his hand up and down over the place."

Von Helmont [1577–1644] wrote a treatise on "The Magnetic Cure of Wounds."

Father Kircher in 1646 described his experiments on animals, in whom he produced a kind of catalepsy.

The "ghost dances" of which we have recently (1890) heard so much in connection with the Indian rising, seem to consist in producing hypnosis by dancing in a circle.)

It has at different times and in different countries been the subject of investigation by royal and academic commissions, and special legislation has been called into existence to deal with it.

Friedrich Anton Mesmer (Mesmer was born at Weiler, near

Stein, in 1734. He graduated M.D. in 1766, defending a thesis on "The Influence of the Planets on the Human Body." He died at Mersburg in 1815), a doctor of medicine, of Vienna, settled in Paris about 1778, and soon created a furor on account of the wonderful cures which it was alleged he effected by means of magnetism. He publicly asserted that his treatment was of universal applicability, and that his discoveries would "enable the physician to decide upon the health of every individual, and of the presence of the diseases to which he may be exposed. In this way the art of healing may be brought to absolute perfection."

Mesmer surrounded his treatment with a great deal of impressive mystery. His patients assembled in a large room dimly and religiously lighted, and from an adjoining room came the enchanting strains of harp or harmonicon. In the centre of the patients' room stood the "*baquet*," a large tub containing bottles; iron rods were also stretched outward from the tub, and these were held by the patients, while they gazed upon the bottles. Cords connected the patients to each other.

Mesmer himself walked about the apartment, carrying an iron rod, with which he touched the patients. Sometimes he discarded his rod, in order to magnetize special patients either by means of strokings or by what we call fascination.

Many of his clients were convulsed, some became violent, and for the latter padded rooms were provided.

The clamor to be treated by Mesmer became so great that the hotel which he rented could not hold the applicants, and he had to undertake to impart the magnetic virtue to a tree in one of the streets, round which hundreds of people gathered daily.

The Faculty of Medicine held a meeting to inquire into the new method, but they seem to have condemned Mesmer, without any investigation.

He left Paris in disgust, notwithstanding a government offer of a life pension to remain. After a time he returned, and in 1784, by the order of Louis XVI., a government commission was appointed to inquire into his pretensions. The report of the commission was adverse, asserting among other things that "there is nothing to prove the existence of the animal magnetic fluid," and that "all treatment in public, in

which magnetism is employed, must in the end be productive of evil results."

The first signature to this report is "B. Franklin," our own great scientist (though Franklin appended his name to this report, he was unable through ill health to attend any of the meetings in Paris, and only witnessed a few experiments conducted by the commissioners in his own house at Passy. One of the commissioners, De Jussieu, refused to sign the report, but declared in a separate statement that "man can produce upon man a positive action by means of friction, by contact"), and among the others is that of Guillotin.

This was the death blow to Mesmer's popularity in Paris, and he proceeded at once to Germany.

Mesmerism, however, continued to be practised in France by individual observers.

In 1812 the Prussian government sent Wolfart to Frauenfield, where Mesmer had settled, to examine and report. Wolfart not only declared in favor of Mesmer, but adopted his practice in his hospital treatment. In 1817 a law was passed confining the use of magnetism in Prussia to medical men.

Du Potet began a series of observations at the Hôtel Dieu in 1820, and in 1825 the French Academy of Medicine, at the solicitation of Foissac, appointed another commission to re-examine the claims of animal magnetism. The report of this commission concludes thus: "Some of the magnetized patients experienced no benefit. Others derived more or less relief from the treatment; in one case habitual suffering was suspended, in another strength returned, in a third epileptic attacks were averted for several months, and in a fourth serious paralysis of long standing was completely cured.

"Considered as the agent of physiological phenomena, or as a therapeutic expedient, magnetism must take its place in the scheme of medical science, and consequently it should be practised or superintended by physicians only."

Strange to say, such was the prejudice among the general body of Academicians, this report was suppressed.

About 1837 Du Potet came to London, and made the acquaintance of Dr. John Elliotson, at that time physician to the University College Hospital.

Elliotson was so much impressed by what Du Potet showed him that he adopted magnetism into his regular practice.

The council of the University College passed a resolution forbidding the use of the new agency in their hospital. (Extract from the minutes of the Council: "Resolved, that the Hospital Committee be instructed to take such steps as they shall deem most advisable to prevent the practice of mesmerism, or animal magnetim, in future within this hospital" [December 27th, 1838].) Elliotson refused to submit to such dictation, and at once threw up his post.

Mesmerism was also bitterly attacked by the medical journals (extracts from the "Lancet:" "The science of mesmerism dares no longer affront the common-sense of the profession, or dares to show its face after the last exposure [September 15th, 1838]. We regard its abettors as quacks and impostors; they ought to be hooted out of professional society." "The patient, alias the victim, alias the *particeps criminis,* is almost as bad as the operator; and even the man who reads about such performances is a leper" [October 29th, 1842]), but in spite of such opposition Dr. Elliotson continued to advocate and practise mesmerism,[1] and so high was the value set upon his attainments as a physician, and his integrity as a gentleman, that the College of Physicians invited him to deliver the Harveian oration in 1846, the president expressing the hope, and the registrar assuring him of the "generally and strongly felt wish," that he would accept the honorable office.

In the oration which he delivered, Elliotson referred to the treatment Harvey had received when he first made known his great discovery, how he was declared to be a fool, how his practice dwindled away, how he was lampooned from one end of Europe to the other, and, in proof of the bitterness of the attacks, quoted the following words of Harvey to show how painfully this great man was stung: "Dogs must bark and vomit forth what is in them, . . . but we must prevent them from biting or infecting with their maddening venom, or gnawing the bones and foundations of truth. . . . Let them continue to revile till, if they are not ashamed, they are at least sick and tired." (Harvey died in 1657, at the age of seventy-nine. Hume, in his "History of England," tells us that Harvey's "practice in London diminished extremely, from the reproach drawn upon him by his great and signal discovery.")

Elliotson had not long to wait for the iron to enter his own soul, and for the same weapons of personal vilification, which had been used to crush Harvey, to be wielded against himself.

His Harveian oration was delivered on June 25th, and on July 4th, 1846, the "Lancet" wrote, "Does he himself (Dr. Elliotson) treat the harlotry which he dares to call science with any respect?" and in 1848, the Harveian orator for the year, Dr. Francis Hawkins, used these words: "Among the quacks, the impostors called mesmerists are in my opinion the especial favorites of those, both male and female, in whom the sexual passions burn strongly, either in secret or notoriously. Decency forbids me to be more explicit."

The apothecary of the Middlesex Hospital, Mr. George Corfe, also issued a pamphlet, entitled "Mesmerism tried by the touchstone of truth," from which I extract the following: "All the patients have universally expressed themselves worse than before, when real disease existed; and when nervous disorders only were present, the mind has been worked upon, the lascivious passions have been excited, and the will, unable to control the animal desires, has lost its balance, and the patient has then been momentarily stupefied, . . . but only to wake to a more libidinous state than before; and this has sent them sooner or later to wander about the streets to gratify their lusts, and thus they have become open prostitutes.

"I hesitate not to affirm that it (mesmerism) is from the devil; . . . it is my firm conviction that any individual who ardently pursues such a tract of delusion . . . is possessed of devils."

Again in 1850, another Harveian orator, Dr. J. A. Wilson, says: "Get out of the way, . . . you hydropathists, . . . you mesmerists. To all who cultivate genuine medicine, . . . who try to preserve their good feelings, . . . purity, and morals, to all who prefer living in honest poverty to growing rich by the systematic quackeries and mesmerism, . . . let us return due thanks."

It is interesting to notice that hydropathy, which is here so sweepingly denounced, has now made good its claims to be considered, and that in all modern works on therapeutics it ranks as a legitimate and useful agent.

To us who look dispassionately back to the warfare against Elliotson, it may seem that the fighting was not fair. I can-

not say whether Elliotson laid his case wisely before the profession of his time, but it does appear to me that personal abuse and indecent insinuation are poor forms of argument. However, they succeeded in ruining Elliotson. (One reason why Elliotson was so bitterly attacked, and which seems to have been to some extent a justification of the attitude of his opponents, was that he largely employed two sisters named Okey to diagnose obscure cases. They were what we would call "clairvoyantes." The use of such assistants finds no countenance in Nancy; though in Paris, Luys' "transfer" subjects are closely akin. See later.)

Let us hope that in these days scientific observation and critical examination will replace prejudice and vituperation.

Dr. James Esdaile, in 1845 (a most interesting biography of Esdaile is published in Leslie Stephen's "Dictionary of National Biography," from the pen of Dr. A. T. Myers. From it I cull the following notes: Esdaile was born in Montrose in 1808, and graduated as M.D. in the University of Edinburgh in 1830. He went to Calcutta in the service of the East India Company in 1831, but was afterward given charge of the Hooghly Hospital. He had read newspaper scraps concerning mesmerism, but the first time his attention was seriously drawn to the subject was when he read Elliotson's statements. Esdaile had never seen any one mesmerized before trying his first experiment, on April 4th, 1845, on a Hindoo convict, who was in need of two very painful operations. When the pain was most severe, and only one operation complete, it occurred to him to try to soothe the patient by "mesmeric passes." After a time deep sleep was induced, with complete anæsthesia. This experiment was witnessed by an English judge, who testified to the suspension of sensibility. A week later Esdaile again mesmerized the patient, and performed the second operation quite painlessly. These results were first printed in the "India Journal of Medical and Physical Science," May, 1845. When Esdaile had collected one hundred cases of anæsthetic operations, he reported the results to the government, whereupon Sir Herbert Maddock, the deputy governor of Bengal, appointed a committee of seven members, four of whom were medical men, to report on Esdaile's operations. They carefully investigated nine operations, on which they reported favorably, adding that it was "incumbent on

the government to afford to their zealous and meritorious officer such assistance as may facilitate his investigations." Accordingly in November, 1846, a small hospital in Calcutta was placed at his disposal for a year. Medical visitors were appointed, who, in December, 1847, reported that "complete insensibility to pain was attained by mesmerism in the most severe operations, and its influence in reducing the shock of the operation was decidedly favorable." The new governor-general, Lord Dalhousie, in January, 1848, promoted Esdaile to be presidency surgeon, and in 1850 further promoted him to be marine surgeon. Esdaile left Calcutta June 1st, 1851, having recorded 261 painless operations, with a mortality of five and one-half per cent. He settled in Perth, but afterward went to live at Sydenham, where he died, January 10th, 1859, aged fifty), began to make use of mesmerism in Calcutta, and was so successful that the government placed a special hospital at his disposal. He has left a record of over 250 operations painlessly performed by the aid of mesmerism,[2] including such major cases as lithotomy, amputations, and the removal of large tumors in elephantiasis. (I recently had a communication from a general who was present at one of Esdaile's operations. He informs me that he saw a tumor removed which was larger than the patient's body, and had to be held up by a chain from the ceiling during the operation.)

To James Braid, a Manchester surgeon, the honor is now generally accorded of having rescued mesmerism from the region of quackery, and of endeavoring to secure it a recognized place in medicine.

In 1841 Braid was greatly struck by the public exhibitions of Lafontaine, and determined to put their genuineness to the test. He made experiments on his wife and servants, and found that he could produce what was called "mesmeric sleep" by inducing them to look steadily at the neck of a bottle or similar object held in front of and a little above the eyes.

He very early became convinced that the so-called sleep did not depend on any mysterious fluid or influence passing from the operator to the subject, and so, to put an end to such pretensions, proposed that the term "hypnotism" should replace "mesmerism," "animal magnetism," etc.

Braid appears to have had considerable success in the

treatment of various ailments, and also in the use of hypnotism for the production of anæsthesia. In 1842 he offered to read a paper and give a demonstration before the British Association, which was about to meet in Manchester, but the offer was not accepted. (Seeing that there was a medical section at the meeting in question, it seems strange that the British Association should have declined Braid's paper; and a reference to the reports of the section makes the refusal highly amusing, for among the papers which were accepted was one on the "Palpi of Spiders," the object of which was to prevent the audience mistaking young spiders for old ones!)

In 1843 he published a book dealing with the subject.[3] He claimed to have found hypnotism useful in cases of rheumatism, epilepsy, paralysis, neuralgia, palpitation, etc.

Soon after the appearance of Braid's book, Dr. Joly, of London, amputated an arm painlessly by means of hypnotic anæsthesia (1845), and Drs. Fanton and Toswell were equally successful in a case of thigh amputation. The great Liston, too, made use of Braid's method in some of his operations, and the celebrated surgeons Velpeau and Broca reported that they had employed hypnotism satisfactorily in twenty-four operations.

The great body of the profession, however, do not seem to have taken kindly to hypnotism, and so when chloroform was introduced, and rightly thrust hypnotic anæsthesia into the shade, Braid's work was speedily forgotten, and the therapeutic possibilities of hypnotism completely ignored. (I have made careful inquiries from physicians and surgeons in Manchester who still remember Braid and were present at many of his demonstrations. The general consensus of their opinion is that hypnotism was wrecked for the time being by Braid's own over-zeal. Like many another pioneer he became an enthusiast, and claimed too much for the agency he sought to introduce.

I cannot help thinking, however, that the real reason, perhaps now forgotten, was the dread of facing the attacks which were, as we have seen, made on Elliotson.)

It must not go unmentioned that a few men of note did investigate the phenomena of hypnotism at this time. Thus we find Sir David Brewster, Sir William Hamilton, Dr. Simpson,

Gregory,[4] Carpenter, and others trying to solve some of its problems.

Here and there, too, might be found medical men venturesome enough to make a regular use of hypnotism; but professional opinion had practically relegated it to the charlatans, and in 1850 there were flourishing "mesmeric infirmaries" in Bristol and London (Bedford Street), conducted apparently solely by laymen; the superintendent of the latter institution publishing a report of his successes in 1851, and claiming to have cured many of the "incurables" of the regular hospitals, including cases of deafness, hemiplegia, and chronic rheumatism.[5]

At this period also there was published quarterly a review entitled "Zoist," a journal of cerebral physiology and mesmerism, largely devoted to alleged cures by mesmerism.

Even this development seems to have pined away, and after 1855 we find little mention of the employment of hypnotism, by either medical men or laymen, as a curative agent in England.

The labors of Elliotson and Braid, who were without honor in their own country, were not to be wholly lost sight of. A copy of Braid's book fell into the hands of a Dr. Liébeault, then a young man, practising in Nancy. He was very much impressed with the experiments of the Manchester surgeon, and at once proceeded to repeat them. He found that he could readily produce hypnosis, and that it seemed to be followed by beneficial results. An extended trial convinced him that hypnotism was capable of becoming a useful remedial agent, and so he opened a free dispensary for the treatment of the poor of his town in 1860.

At first he followed Braid's methods to the letter, but he soon found that verbal suggestions greatly heightened the effect of hypnotism, and began to employ them in every case.

It must not be assumed, as it is very often, that Braid had entirely overlooked the influence of suggestion, but he certainly had not used it regularly, nor sought to make it the main part of his treatment.

In 1866 Liébeault published his first work on the subject.[6] This was received with suspicion, and its author was regarded by his professional brethren as either a knave or a fool. Still, he kept on his way, undisturbed, happy in the belief that,

though he was unnoticed, nay, even shunned, by the medical men of Nancy, he was at least rendering good service to the suffering poor, from whom he sought no reward.

We, in England, might have remained in ignorance of Liébeault and his method had it not been that in 1881 M. Dumont, of the Nancy Faculty of Medicine, began to attend his dispensary, and was convinced of the genuineness of his work. Dumont made some experiments in the Mareville Asylum, which were satisfactory, and in 1882 he read a communication before the medical society, and showed some of his patients whom he had successfully treated by Liébeault's plan.

Professor Bernheim was present (probably both M. Dumont and Professor Bernheim were led to inquire into the work of the hitherto obscure hypnotist of their own town, by the attention which was attracted to the subject of hypnotism by Charles Richet's article, "Du Somnambulism Provoqué," published in 1875, and still further by the renowned Charcot's experiments begun at the Salpêtrière in 1878) and, to use his own words, has since experimented, "with great scepticism, in the beginning, I must confess," but he met with "results so certain and striking that they forced the duty of speaking" upon him. He published in 1886 his great work on hypnotism in its therapeutic application.[7]

So great a reputation was enjoyed by Bernheim that his adoption of hypnotism at once secured it the respectful attention of a large section of the profession, and now it has its practical adherents in France, Germany, Russia, Austria, Italy, Spain, Belgium, Holland, Sweden and Norway, Switzerland, Denmark, Portugal, Greece, and America. (So important has the study of hypnotism become that not only had the International Congress of Experimental Psychology [Congrès de Psychologie Physiologique] held in Paris in 1889 a special section for its consideration, but there was also held, about a week earlier, a separate Congrès de l'Hypnotisme, which was successful.

An interesting account of the general progress of hypnotism, especially during the past fifteen years, is to be found in the "Practitioner" of March, 1890, entitled "Hypnotism at Home and Abroad" by A. D. Myers, M.D., M.R.C.P.)

The first English medical man, so far as I know, to take

up the Nancy treatment was Dr. C. Lloyd Tuckey, of London, and to him undoubtedly belongs the honor of first daring to challenge public opinion, by publishing a book advocating the adoption of it.[8]

In 1889 Dr. Auguste Voisin, one of the physicians of the Paris Salpêtrière, read a paper before the British Medical Association at Leeds, in which he reported cases which he said he had cured by means of hypnotic suggestions. His patients included cases of delusions, suicidal ideas, acute mania, dipsomania, onanism, and amenorrhœa.

This communication was received with ill-disguised incredulity.

A single year has, however, sufficed to bring about a remarkable change in the attitude of the profession toward hypnotism, and the 1890 discussion at Birmingham seemed like the dawn of a new era in its career.

The fact that the British Medical Association, the most powerful society of medicine in the world, has at last declared the phenomena of hypnotism to be "worthy of investigation" has justified every member of our profession in at least making himself familiar with the subject and, if so inclined, putting his knowledge into actual practice. The stigma of reproach, which once attached to the man who investigated hypnotism, is forever removed, and there is no longer any fear of honest inquiry being branded as a sign of "possession of devils."

In common justice one is also bound to state—and to do so is a pleasure as well as a duty—that the "Lancet" of to-day and the "British Medical Journal" both seem inclined to adopt a thoroughly scientific and impartial spirit toward the inquiry of hypnotism, and to both those influential papers I am personally indebted for many acts of courtesy and consideration.

To those of my readers who would like to acquaint themselves more fully with the history of hypnotism I can commend "Hypnotism," by Dr. Albert Moll, London, 1890; "Suggestive Therapeutics," by Professor Bernheim, London, 1890; "Animal Magnetism," by Binet and Féré, London, 1888.

CHAPTER II.

DEFINITIONS.

THERE is nothing like starting with clear ideas, and so at the outset it will be well to differentiate some of the terms in common use, and state as clearly as possible what we understand by them.

In the last chapter, we were forced to use the expressions "animal magnetism," "mesmerism," and "hypnotism," to some extent, as if they were interchangeable.

Mesmerism was clearly synonymous with animal magnetism, and was simply adopted by popular consent in honor of Mesmer; and the great contention on his part was that some mysterious magnetic influence passed from the person of the operator to the subject.

Braid denied that any such influence existed, and explained all the phenomena which he saw on purely physical principles, and adopted the word hypnotism to signify this.

In many minds to-day there is great doubt as to where the scientific frontier between hypnotic phenomena and certain other curious conditions should be set up. Even Bernheim, as recently as 1889, declared that "our knowledge of animal magnetism and hypnotism is as yet too imperfect to allow of our fixing their limits exactly."

As this is purely a practical book, and in no way concerned with any theories not bearing on the treatment of disease, I must at once state that I deliberately exclude, from our consideration here, thought-reading, thought-transference, spiritualism, clairvoyance, and all similar phenomena, which more or less imply something like a magnetic effluence from the operator or medium to the subject—though I do not for one moment deny the great interest which attaches to their investigation.

To those of my readers who wish to study these most fascinating subjects, I cordially recommend a perusal of the pro-

ceedings if the Society for Psychical Research (Trübner & Co.).

This society has been in existence since 1882, and the extent and quality of its investigations are astounding. The philosophic aspect of hypnotism has also received a large share of attention, and the observations of the committee on hypnotism, and especially the reports of Messrs. Myres and Gurney, will well repay careful perusal.

We mean, then, by the word "hypnotism," the science which treats of the condition which we call "hypnosis," but disavow all claim to its depending on any magnetic basis.

By "hypnotic suggestion" we mean any suggestion made by the operator to his patient, either verbally, in writing, by gesture, look, or in any other way, during hypnosis.

By the word "hypnosis" (ὕπνος = sleep) Braid clearly meant what the mesmerist called the "magnetic sleep." But our use of the term must be qualified, for it is a great mistake to assume that all persons who are hypnotized sleep, or that a person who does not sleep is necessarily not in a state of hypnosis.

We cannot now very well begin to amend our nomenclature, but it seems to me almost a pity that Braid did not select some other word which would not in its derivation have implied sleep as a special condition. By some the term "braidism" is used, and certainly has the merit of being colorless (see "Quain's Dictionary of Medicine"). A long discussion on the subject of the terminology of hypnotism took place at the Congrès de Psychologie Physiologique in Paris in 1889. The great essential feature of hypnosis is, however, not sleep, but a heightened receptivity of suggestion with or without sleep; in other words, any suggestion offered to a person during hypnosis has an exaggerated effect on his mind.

Now, though this quality is the really distinctive badge of hypnosis, it must be readily admitted that if actual sleep is induced the susceptibility to receive suggestion is in most cases increased, and my observations lead me to believe that up to a certain point the deeper the sleep the greater the effect of suggestion. (Some subjects pass into such a profoundly lethargic condition that they seem to be insensible to suggestion. Such cases are, however, comparatively rare.) The person who produces hypnosis is spoken of as a "hypnotist."

The person hypnotized is called a "hypnotee," or, less correctly, a "hypnotic." He is often also called a "subject."

"Hypnogenesis," "hypnosigenesis" (Moll), "hypnogeny" (Myers), are all terms used to express the production of hypnosis.

Methods of Producing Hypnosis.

Before considering what is the condition of the hypnotee, it will be well to describe some of the numerous methods which can be employed to bring about hypnosis. .

Mesmer's Methods.—As we have seen, Mesmer did not rely solely on one method, but sought to affect his clients in several directions. Thus, he called imagination, music, fixed attention, passes, and fascination, to his aid.

Braid's Method.—Braid got his subject to look fixedly at some object, preferably shining, held before and above the eyes, and to rivet his whole attention on it.

The strained position of the eyes, and the slight convergent strabismus which resulted, were held by Braid to produce a tired condition of the brain, and so to encourage sleep. Four or five minutes, in general, sufficed to develop hypnosis in this way. Dr. Carpenter has pointed out that the mere convergence upward of the eyes will sometimes produce hypnosis, and that thus persons in the dark may be influenced, or that blind persons may be hypnotized. (Professor Macalister thinks that the forced upward gaze produces a strain on the capsule of Tenon, and consequent drag on the sclerotic, with intra-ocular tension of the vitreous chamber, as well as intra-orbital pressure on branches of the fifth nerve. See Lasègue's method.)

Passes.—The method of producing hypnosis by passes was much affected by Mesmer and all the old "magnetizers," and great attention was paid to the minutest details. There were short passes and long passes—passes confined to the hands, as well as others over the chest, or from the head to the knees.

These passes were often accompanied by a fixed stare of the operator into the eyes of his subject.

Moreover, it was held to be essential that the operator should exercise very powerful volition, and it is interesting to read the instructions given in some of the older handbooks

for "throwing by volition one's nervous energy into the patient's body."

It was also held by many that it was imperative that the operator should not speak during the process.

When passes were made with the intention of "projecting healthy influence into the patient," they were spoken of as "positive"; but when the object was to "withdraw diseased influence from the patient," they were called "drawing off" or "negative."

It was held to be necessary to make the passes downward, as upward passes were thought to produce headache; the latter were sometimes employed for wakening the subjects, but only when fanning or speaking to the patient failed to arouse him.

Professor Richet, of the University of Paris, uses passes largely for the production of hypnosis. He proceeds in this fashion: The patient is seated, and the operator sits in front of him, and raises his hands to the level of the patient's head, with the palms toward the patient. They are then slowly brought down near but not touching the patient, to the level of the stomach; they are then raised in a circular way, and brought down again, the passes being at the rate of three or four to the minute, and in a successful case the process occupies about ten minutes.

Fascination.—What is called the method of fascination is often used by professional mesmerists. It was especially employed by one called Donato, and on this account has sometimes been spoken of as "donatism."

The subject is induced to gaze steadily into the operator's eyes. In a short time it is found that the subject will imitate every gesture of the operator, all the while keeping his eyes fixed on those of the operator.

In using this method one has to be very careful, for it has happened more than once that the operator has involuntarily become hypnotized before the subject has been affected.

Lasegue's Method.—Lasègue, a Paris doctor, strongly advocated closing the eyelids, and making gentle pressure on the eyeballs, which was sustained for several minutes (*pression des globes oculaires*). (Professor Macalister thinks, as we have seen, that Braid's method exerts a certain amount of intra-ocular pressure. If this be correct, Lasègue's method

would appear to be a part of Braid's, only carried out in another fashion.)

Berger's Method.—Professor Berger, of Breslau, held that warmth was alone sufficient in many cases to induce hypnosis. He found that in some cases his hot hands held near the head of the subject sufficed. He also claimed similar results by putting warm metal plates near his patients' heads.

Fright.—We all know, perhaps from personal experience, how a sudden fright will for a moment almost paralyze us.

The Abbé Faria, a Portuguese priest, who lectured in Paris in 1814, used to get his subjects to concentrate their thoughts and gaze into his eyes. After a short interval he suddenly shouted to them, "Sleep!" and in many cases he is said to have succeeded in thus producing hypnosis.

Charcot has found that in many of his subjects the unexpected noise of a Chinese gong or the sudden flash of a magnesium or electric light produced hypnosis; but it must not be lost sight of that all Charcot's subjects were hysterical.

Magnets.—Landowzy states that a magnet may, even without a person's knowledge, bring about hypnosis. This observation is supported by Binet and Féré.

Electric Battery.—Weinhold declares that he succeeded in hypnotizing by means of an electric current.

Monotonous Sounds, Smells, etc.—Charcot in some of his experiments placed a large tuning fork near his subjects, and kept it vibrating by means of an electromagnet.

The ticking of a watch held to the ear is sometimes used successfully.

Slow music will sometimes hypnotize. (I find these methods greatly facilitated by closing the patients' eyes.)

Binet and Féré succeeded in producing hypnosis by fatiguing the sense of smell with the odor of musk.

Luys' Revolving Mirror.—In France, bird-catchers use an ingenious method of luring their victims to the snare. A piece of wood studded all over with small squares of silvered glass is mounted on a metal-tipped stick in such a way that it can rotate. The upright is then stuck in the ground, and by means of a cord the bird-catcher is enabled from a distance to make the top of the contrivance revolve rapidly. The glittering of the glass seems to fascinate the birds, and they

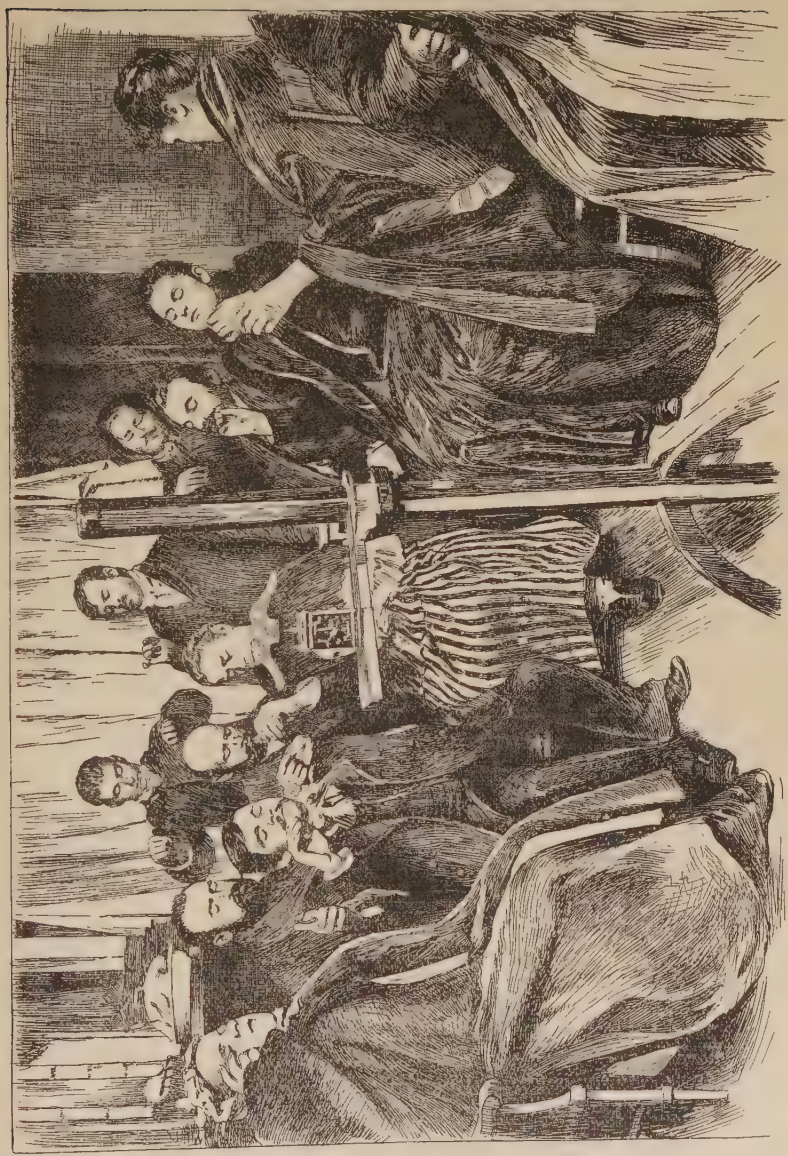


FIG. 1. DR. LUYS' REVOLVING MIRROR.

soon fly down and hover about, when they are easily trapped in nets. It is principally used for catching larks, and so is often called a "lark mirror." Dr. Luys thought the method might be used for hypnotizing human beings, and so he had a similar machine made on a small scale and worked by clockwork. One great advantage claimed for this "*miroir rotatif*" is that it saves the operator much fatigue, and makes the process much more impersonal than some of the others. It can also be used to hypnotize a number of subjects at one time. Dr. Luys further claims that it never fails, and that its employment is never attended by any unpleasant consequences.[9]

If experience bore out these assertions, this instrument would be very valuable, but, having tested it largely, I must say that it is a very unsatisfactory means of inducing hypnosis. It is very uncertain, and I have lately seen it fail in several cases in Luys' own clinique. More than this, I have known it in some patients produce headache, giddiness, and palpitation.

As to the claim that it is impersonal, the same object can be attained by asking the patient to look at a nail in the wall or any similar inanimate object, and if it is desired to operate on numbers of patients simultaneously (a proceeding which I must strongly deprecate, as I hold that each patient demands the undivided attention of the hypnotist) this can just as well be done by getting them to sit in a circle and look at a glass ball placed on a table in the centre of the group.

Darling's Method (Darling was an American doctor, who came to England to lecture, in 1850, on what he termed "electro-biology," but which is identical with mesmerism) was to give the patient a small metal disk, which was held in the hand, and steadily looked at.

Liébeault's, or the Nancy Method.—After a fair experience of most of the methods mentioned, I have found that adopted by Dr. Liébeault to be on the whole the most satisfactory and generally applicable, as well as freest from unpleasant complications.

I will endeavor to describe it fully.

The patient sits as comfortably as possible in an easy-chair with his back to the light, and the doctor stands beside him and holds up the index and middle fingers of his own hand about six or eight inches from or a little above the pa-

tient's eyes. The patient is told to look at these, and try not to think of anything. Almost immediately the operator begins, in a low and monotonous tone, to suggest sleep, after this fashion: "You are beginning to feel sleepy," "Your sight is getting dim," "My fingers are getting indistinct," "Your eyelids are drooping," "Your eyes are closing," "Sleep!" etc.

Presently, and in many cases in an astonishingly short time, the patient's eyes do begin to blink, and then close, perhaps to reopen sluggishly a time or two before finally closing. In a space varying from half a minute to four or five minutes the eyes close, and show no sign of opening again. If not, the doctor gently closes them, and keeps them shut with his finger and thumb.

Then Dr. Liébeault rubs the arms, trunk, and legs, but especially the epigastrium, and verbally suggests warmth.

Interspersed with these suggestions, there is an ever-recurring suggestion of "Sleep!" (*dormez*).

Here, then, is a method combining Braid's with verbal suggestion, and herein lies the great advance made by Liébeault, though, to his credit, it should be stated that the Nancy physician never wearies of expressing his indebtedness to the English surgeon.

Liébeault frequently adopts the method of suggestion alone, closing the patient's eyes, and repeating phrases like those above.

Bernheim, too, largely adopts this plan.

Amsterdam, or Method by Suggestion.—The method by suggestion alone is really, as we have seeen, one of Liébeault's resources; but I have ventured to call it the "Amsterdam" method, because I found it exclusively employed there by Drs. Van Renterghem and Van Eeden, who are both pupils of Liébeault, and together conduct a perfectly model policlinique.

These gentlemen place their patients lying down, close their eyes, and verbally suggest sleep.

They also gently stroke the forehead and temples, which, no doubt, by its monotonous stimulation of the skin assists the onset of hypnosis.

This method is said to succeed as well as any other; but my own experience leads me to think that the coupling with

suggestion of fixing the gaze on some object is a decided help in many cases.

Résumé of Methods.—I do not pretend to have exhausted all the devices for producing hypnosis, for practical observers will find that they can succeed in endless ways by coupling methods or trying others analogous to those referred to.

Efforts have been made to systematize the various methods, and they have been subdivided into physical and psychical.

The physical are held to be those which act by stimulating the senses, either sight (Braid), hearing (Charcot), smell (Binet and Féré), touch (passes or stroking), electricity, etc.

The psychical are held to be those which act by concentrating the mind on the idea of sleep.

Further subdivisions have been made by many writers.

I cannot help thinking that in most of the so-called physical processes there is a large element of suggestion, because nearly every patient knows perfectly well for what purpose his sight, hearing, or touch is stimulated.

In actual practice it will be found that no one plan will succeed in all cases. Some patients will be found wholly insusceptible to one method, but will readily yield to another.

I generally begin with Liébeault's plan. If that fails, I find the next best is to close the eyes, and gently stroke the face, arms, and chest, verbally suggesting sleep at the same time.

As to the position of the patient, I think for many and obvious reasons the sitting posture is preferable to the recumbent; but in some obstinate cases I have found that a standing position is distinctly helpful.

Aids to Hypnosis.—A quiet room is a great help to both operator and subject, as any disturbing noises or movements are apt to distract the mind (if a person has been hypnotized several times, he may not be so sensitive); for this reason, it is well not to have many people present.

It has been stated that the morning is the best time to hypnotize, but I cannot say that I have found one time more favorable than another. But it certainly has seemed to me that if a patient is fatigued from over-exertion he is not so easily affected as if he is fresh, and probably this is the reason for preferring the morning.

Ringier has noticed that summer is a better time than winter for hypnotism.

I do not think the mere season has any effect, but I have frequently found that if the patient is cold, or the operator touches him with cold hands, hypnosis is more difficult. However, these difficulties are got over by having a warm room to operate in.

A calm mind is most essential on the patient's part; for if he is greatly excited, or very nervous about the effects of hypnotism, it will be found almost impossible to influence him, and it is better in most cases not to try.

Chloroform and morphia have been suggested as aids to producing hypnosis; but I think it very unwise to make use of them.

Heidenhain found that the inhalation of nitrite of amyl assisted and heightened hypnosis.

The co-operation of the patient is generally held to be absolutely necessary, and I certainly believe that this may be accepted as almost a universal rule, for if any of the physical methods are sought to be employed, say the gazing on an object, if the patient does not want to be affected, he simply declines to fix his eyes upon it; whereas if suggestion is the means, he has simply to refuse to listen, or to let his mind wander to other subjects.

To nearly all rules there are certain exceptions, and here we must exclude those hysterical subjects of Charcot, who are rendered cataleptic or lethargic by a sudden sound or flash of light. Charcot himself estimates these poor neurotic patients as 1 in 100,000.

Ochorowicz mentions the case of a lady who was hypnotized by him without her knowledge; but she was a person who was practically constantly hypnotized by him, and the evidence he gives of her not being aware of his intention is not by any means conclusive.

Another patient was hypnotized by the same observer, notwithstanding her protests that she would not be influenced; but here again we find that she had been regularly hypnotized by him.

Heidenhain adduces, as a proof that some persons can be hypnotized against their will, the case of a soldier whose officer commanded him not to sleep. Heidenhain then closed his eyes and held a watch to his ear, and hypnosis resulted.

In this case, if the soldier had not known that it was sim-

ply an experiment, in which perhaps the officer was as much interested as the doctor, he would not have submitted to having his eyes closed, nor to the watch being held to his ear.

I have not yet seen any evidence adduced to weaken the general rule that (excluding extreme cases of hysteria) it is impossible to hypnotize against the will of a person.

On the other hand, it should be stated that the hearty cooperation of the patient will not insure successs in all cases.

I have frequently failed to produce even the slightest effect on persons who came expressly for the purpose of being hypnotized, and were most anxious to be affected. The very anxiety to be hypnotized seems to be a hindrance to success in these cases.

Perseverance is in hypnotism, as elsewhere, sometimes needed in order to insure success; some patients in whose cases hypnotic treatment seems likely to be useful are not influenced in the slighest degree, but even seemed to be rendered more wakeful by a first attempt. In such instances, repeated trials should be made. Professor Gregory asserts that "every one can be hypnotized with patience and perseverance."[10] This may or may not be correct, but the question is, How much patience is required? It is not every patient who is willing to submit to frequent trials, nor is every doctor willing to make them. Dr. Milne Bramwell is reported to have made sixty-eight fruitless attempts with one lady, and to have obtained complete success on the sixty-ninth attempt!

I must confess that as a rule if I do not succeed in making some impression on a patient in four (or in exceptional cases six) sittings, I abandon the attempt.

Advantages of Hypnotic Treatment.—Assuming, for the sake of argument, that in certain cases hypnotic treatment is useful, it seems to possess some advantages over other methods.

Thus, in some cases which are admittedly amenable to ordinary medical treatment, hypnotism seems to afford relief very much more rapidly. I have seen rheumatic pains, which no doubt would have yielded to salicylate of soda, entirely vanish after five minutes' hypnosis.

Again, if it is successful, there can be no question of its deranging the digestive organs.

Every physician has come across patients who were intol-

erant of certain drugs which have seemed indicated. Individual idiosyncrasies in regard to opium, quinine, arsenic, bromides, salicylates, digitalis, ipecacuanha, antipyrine, etc., are not uncommon. There are very few sedative drugs which are not more or less objectionable on account of their producing headache, constipation, or biliousness. Many of our best tonics have frequently some such counterbalancing objection.

If hypnotism is suitable in any case, it is free from all these after-effects.

Another advantage of hypnotic treatment, though I do not mention this by the way of comparison with our other resources, is that it seems absolutely free from indelicacy, as there is no necessity for the patients to even partly undress to undergo the process, and so it is quite admissible to treat them in the presence of their relations or friends.

CHAPTER III.

PHENOMENA OBSERVED DURING HYPNOSIS.

The Onset.—The symptoms which may be noticed during the onset of hypnosis vary somewhat according to the method employed for its production.

Many of Mesmer's subjects exhibited violent convulsions on the onset of hypnosis.

If Braid's method be adopted, there may, though only very occasionally, be noticed a kind of nervous trembling of the limbs.

If fascination be the means employed, the only thing which may strike an onlooker is, in some cases, the presence of imitation by the subject of every gesture of the operator. To outward appearance, the patient may seem to be in his natural condition. In other instances, the eyes are seen to close gradually. Where the eyes are first closed, and passes and verbal suggestion used, there may be no indication of the development of hypnosis, except perhaps some modification in the breathing.

If, however, the ordinary Nancy method of Liébeault be resorted to, the following evidences of approaching hypnosis are generally seen by the operator or felt by the patient.

The pupils as a rule dilate and contract; the object looked at grows indistinct; the eyelids blink or quiver; the eyes may water; the breathing frequently becomes quickened and may even be panting; the mouth becomes dry or parched; the pulse is often accelerated; then the eyes gradually close (though sometimes they are shut in the most sudden and spasmodic manner); the eyeballs are often seen to turn upward, and hypnosis has been produced.

This is by no means an exhaustive account, nor are the evidences at all uniform, but this may be accepted as what occurs in an average case.

The Hypnotic Condition.—The phenomena observed, once the patient has become hypnotized, present every variety, according to individual characteristic, and the depth of hypnosis obtained. Thus there may be merely a feeling of drowsiness and disinclination to move, but absolute consciousness throughout and perfect recollection at the end of the sitting of everything which has been said or done while it lasted; whereas, at the other end of the scale, there may be profound sleep, with absolute unconsciousness of everything, save the operator's suggestions, with complete insensibility to pain; catalepsy, somnambulism, the possibility of foisting any delusion upon the subject, or producing post-hypnotic hallucinations; and on awakening, there may be a total forgetting of all that has happened during the sleep.

Between these two extremes are found many gradations, and numerous attempts have been made at classification.

Delbœuf, of Liége, proposes to divide hypnosis into two classes, viz.: Pain felt, pain not felt.

Forel, of Zürich, mentions three stages: Drowsiness, "hypotaxy" or inability to open the eyes; suggestions obeyed, somnambulism—amnesia.

Gurney, the late secretary of the Psychical Research Society, speaks of two stages only: The alert stage, the deep stage.

Max Dessoir, of Berlin, has also two stages: Voluntary movements alone affected, functions of the sense organs affected.

Liébeault introduces six degrees: Drowsiness only; drowsiness with catalepsy (consciousness complete in both); greater somnolence (any movement of the patient, such as rotating the hands, begun by the operator, continued automatically; consciousness still present, and memory); patient only conscious of what operator says—this is remembered; somnambulism, with imperfect recollection; somnambulism—post-hypnotic impressions possible, amnesia complete.

Bernheim goes still further, and suggests nine divisions:[11] Drowsiness—suggestions of heat take effect; drowsiness with inability to open the eyes; catalepsy slightly present; catalepsy more strongly marked; contractures may be induced by suggestion; automatic obedience (in all these stages the patients remember everything, are neither open to suggested illusions nor hallucinations); amnesia on waking—hallucina-

tions not possible; amnesia—slight possibility of producing hallucinations, but not post-hypnotically; amnesia—hypnotic and post-hypnotic hallucinations possible.

Dr. Tuckey, of London, thinks the best plan is to speak of light sleep, profound sleep, somnambulism.

Seeing that there are so many different divisions, I think it is well to discard all attempts at classification until some table is generally accepted by hypnotists.

In actual practice I have found it of little use to attempt to fix degrees arbitrarily, for patients vary as much in hypnosis as they do in their features, and do not respect any theoretic arrangements, but constantly overstep our scientific boundaries, and so render anything like mathematical exactitude of description out of the question.

Dr. Tuckey's divisions seem to me the best, but they hardly go far enough, as he himself points out.

I would suggest, for the present at least, that the main points in each case be described separately.

In the following account of the hypnotic phenomena, I simply hope to describe some of the conditions which may be present or be provoked by suggestion during hypnosis, without reference to any classification, and it must be distinctly understood that these conditions are not present in all cases.

Paralysis may be produced; it may only affect the eyelids, or it may extend to the limbs. In paralysis of the leg, the patellar reflex is exaggerated.

Paralysis may by suggestion be curiously specialized, so as to be limited to a particular movement. Thus, a man may be able to move his arm and hand freely, but, if the operator suggests "You cannot write," it may be wholly impossible for the patient to sign his name. Again, a patient may be able to sing, shout, or whistle, but may be prevented from talking. These special paralyses can be varied *ad infinitum.*

Catalepsy is very frequently present, and by this is meant that, if the arm is raised to, say, right angles with the body, it will retain this position for a great length of time. The legs will in many cases also remain in any position in which they are placed. The hand or a single finger can also be rendered cataleptic; in fact, at the will of the operator, almost any set of muscles may become cataleptic.

In extreme cases, the whole body can be made so rigid that

the patient can be poised in the air, with no more support than a chairback under his head and another under his heels, and in this position will bear the weight of another person on his chest.

The length of time during which the cataleptic condition may be maintained is astonishing. Moll relates an instance of catalepsy continuing for seventeen hours, and other observers have recorded cases in which cataleptic positions were kept up for five, six, and seven hours.

The most striking point about these cataleptic states is that when the patient is aroused he generally has no feelings of either fatigue or discomfort. (Charcot and his pupils Binet and Féré refuse to recognize this as catalepsy, preferring to designate it as a "catalepsoid state," "catalepsoid rigidity," or "pseudo-catalepsy." They hold that in true catalepsy "the eyes are wide open, the gaze is fixed, the limbs offer no resistance to change of attitude and do not tremble, the respiration remains calm. The constrained position cannot be maintained for more than ten or fifteen minutes.")

Somnambulism.—The deeper degrees of sleep in which sensory delusions may be produced, and the patient may be induced to perform active movements, and has an imperfect memory, or absolute loss of memory on waking, are generally called somnambulism.

Some people use the term as a synonym for hypnotism, but this leads to confusion.

Automatic movements, as they are called by Liébeault, are often observed. If the patient's arm be rotated, or his hands set revolving round each other, these movements will be continued for an indefinite period.

Max Dessoir more correctly describes these as "continued movements."

Imitation is frequently observed, so that the patient will do everything that the operator does. If the operator walks away, the patient follows; if the one laughs, so does the other, etc.

A peculiar form of imitation is "echolalie" or "echo-speech"; it is also spoken of as "speech automatism."

Berger observed that "by applying pressure with the hand to the subject's neck, he can be induced to repeat whatever the operator says."

Heidenhain declares that the experiment succeeds just as well if the words are spoken toward the neck, without the pressure, or if the words are directed to the epigastrium.

From personal observation, I cannot help thinking that these experiments must have had a flaw somewhere, for I have never yet seen a patient who would imitate speech when the neck was pressed or when the words were spoken toward the epigastrium unless he knew he was expected to do so. If, in the hearing of a patient in whom "imitation automatism" is present, the suggestion is made that, when any part is touched or the speech directed toward any part of his body, he will repeat the words, the suggestion will probably be carried out; but without such direct or indirect suggestion, I do not think the experiment will be confirmed.

In some patients the mouth is dry, in others there is an increased flow of saliva.

Most patients experience a feeling of warmth and comfort during hypnosis. Perspiration is frequently observed.

The subject of unilateral hypnosis has been much discussed. Braid wrote in 1843 that while a person is in hypnosis "a puff of air, or pressure on one eye, will restore sight to that eye, and sense and motility to that half of the body."

Heidenhain has stated that "stroking the forehead and temple on one side will produce paralysis of the same side; the face on that side remains immovable, and speech is impossible."

Moll thinks unilateral hypnosis depends on suggestion.

I have frequently repeated the experiments of Heidenhain, but never successfully, without verbal suggestion.

Aphasia can frequently be produced during hypnosis; so can aphonia.

Amnesia can in some cases also be suggested. A patient may be made to forget his own name or a given letter or number. Thus, if it is suggested to a patient that there is no such letter as *a* and no such number as 5, he will, in spelling such a word as facial, say "f-c-i-l," or, in counting up to 6, say "1, 2, 3, 4, 6."

Color-blindness can in some instances be developed by suggestion.

Special senses can be suppressed. Thus, strong ammonia can be held under the nostril without the patient wincing if he is told he cannot smell.

Similarly he can eat pepper without inconvenience if it is suggested he cannot taste.

Blindness can be developed in the same way.

Itching is easily produced in many cases. Some patients can be made to feel hot or cold, or to imagine they are oppressed by a great weight, by simple suggestion.

Deafness, too, can often be induced.

Anæsthesia is very frequently present, though in varying degree. Some patients do not notice pinching, but still waken at a pin prick; others are so profoundly insensible that any surgical operation might be performed upon them painlessly. The pulse, respiration, and temperature may in some cases be modified. Thus, if it is suggested to a patient that he is making some great effort, the pulse and respiration may be perceptibly quickened; if it is suggested he is very feverish, the temperature may be raised. Dumontpallier is said to have succeeded in this way in raising the temperature 3° C.

Krafft-Ebing, by suggesting to a patient that he was in a cold bath, produced goose-skin.[12]

Peristalic movements of the bowels can sometimes be controlled.

I have seen De Jong produce and suppress borborygmi by command. I have frequently succeeded in producing an action of the bowels by suggestion during hypnosis.

Krafft-Ebing gave a patient, whose bowels were easily acted upon, two tablespoonfuls of castor oil, with the suggestion that there should be no motion passed for forty-eight hours; an ordinary stool was passed at the end of the time appointed, but no action at all occurred in the interval. (See remark on previous page.)

Diarrhœa can be similarly be induced.

Hunger and thirst can be created or appeased in some persons during hypnosis.

Hallucinations and illusions can be called forth in many persons very easily, and you have only to give the patient a start, for him to fill in details, of which you may not have thought. Thus, I gave a gentleman an opera-glass, and suggested that he was in a theatre. He at once described to me the appearance of the stage, the persons who were on it, the composition of the orchestra, the music, and said it was the "Bohemian Girl" which was being played.

I have succeeded, too, in making a patient think I was a partner of his, who was not present at all, and he sat down beside me to discuss the state of their commercial undertakings.

I have given a pen-knife to a patient as a watch, and he has not only told the time by it, but opened the works, and mentioned the name of a well-known watchmaker as the manufacturer of it.

These hallucinations and illusions could be multiplied *ad nuseam*, but they have become so familiar from the repeated exhibitions of showmen that I do not think it necessary to give further instances.

What are termed "negative hallucinations" are readily induced in some cases. When a person does not see anything where there really is something, he is said to be subject to a negative hallucination.

If it is suggested to such a patient that A is not in the room, he will walk against A without noticing him, or try to sit on the chair occupied by A, thinking it is empty.

Change of personality can sometimes be effected during the hypnotic state.

Thus, a patient can be made to consider himself a general, a policeman, a boy, or a woman, and as a rule he will at once endeavor to "live up" to his new position.

If a middle-aged man is told that he is a little girl, he will look at his frock, speak in a child's voice, and if asked to write will assume a girl's hand, etc.

Moll thinks the handwriting does not change with altered personality, though he admits that, if it is suggested to an adult that he is a boy, he will write his usual hand, but awkwardly, etc.

False memories can in some cases be created. Thus, if a patient who has never been out of England is told that he was in America last year, he may accept the suggestion, and give details of his visit.

Certain faculties may be developed or heightened during hypnosis. Thus, Dr. Tuckey tells us how Grazzini, of Florence, succeeded in getting an uneducated patient, who hardly knew how to hold a pencil when awake, to make copies of drawings during hypnosis, which were wonderfully exact.

A patient of mine who is an accomplished pianist will

frequently when hypnotized play the most delightful and difficult impromptu music, though in his waking condition he confines himself to playing other persons' compositions.

Professors Forel, Krafft-Ebing, Bernheim, and others have published accounts of blisters produced by suggestions given during hypnosis.

I have not had an opportunity to test these statements by actual experiment, but I have myself seen distinct redness of the skin produced on the back of the hand in twenty minutes in the case of a patient to whom I suggested that an ordinary piece of paper bound on with a handkerchief was a blister.

Pain can very often be developed by a mere hint. It is sufficient to say, "What an angry boil you have got on your hand!" "How swollen your face is from that toothache!" etc., to produce intense suffering.

Hyperæsthesia is present sometimes, and manifested in different ways.

Touch may be very sensitive, so that the points of a compass can be distinguished at a much less distance than during wakefulness.

Braid describes some experiments in which the perception of pressure and temperature was particularly heightened so that chairs, etc., could be felt, without contact, at a considerable distance, and a breath of air from the lips could be felt at a distance of fifty feet.

Hearing, too, may be greatly exalted. Braid relates a case in which a patient could only hear the ticking of a watch at the distance of three feet normally, but who, during hypnosis, could hear the same watch thirty-five feet away.

Smell, too, sometimes becomes so sensitive as to be more like the scent of a dog. Carpenter quotes an instance in which a hypnotized person distinguished the owner of a glove in a room containing sixty people, solely by the aid of smell. Braid, too, relates many similar interesting cases.

Vision is sometimes particularly acute. I have repeated a well-known experiment, for which we are indebted to the French school. If a sheet of perfectly clean note paper is handed to a subject, and he is told it is a photograph or a picture, he will accept the suggested hallucination. Now, if the same piece of paper is placed among a number of precisely

similar sheets, and the lot shuffled, he will be able to recognize it.

Binet and Féré pushed this experiment further. They photographed the selected sheets of paper, and found that the subjects could easily recognize the photographs by their containing the suggested portrait.

Binet explains this by showing that on every sheet of paper there are minute differences (*points de repère*) which are not noticed by the ordinary observer, but which become associated in the subject's mind with the suggested face or landscape.

Increase of Muscular Strength.—There is sometimes present a great increase of muscular power, so that patients can perform feats of strength which ordinarily would be impossible.

Dr. Renaud, of Manchester, tells me he was once present at one of Elliotson's private demonstrations, and saw a young and delicate woman (one of the Misses Okey) lift with the greatest ease in one hand a large weight, which a strong man could scarcely raise off the ground with both hands.

Post-hypnotic suggestions can in some cases be successfully given, but of these I will speak more fully later. What is meant by the expression is that certain hallucinations or impressions made during hypnosis may continue after the subject has been fully awakened; or that in some cases a suggestion to do certain acts or see a given hallucination after a lapse of time (*suggestion à échéance*) will be realized.

Rapport is a curious phenenon sometimes present in hypnosis. Where it exists, the patient is, as it were, only "in touch" with the operator. He hears the gentlest whisper of the hypnotist, whereas all other voices and sounds are unnoticed. If his arm is raised in a cataleptic position, a stranger may use all his force to lower it, to no purpose, but it falls at the lightest touch from the operator. If the hypnotist tells him he will now hear and feel a third person, he is at once "*en rapport*" with such person, and in some cases ceases to be in relation to the original operator. In these cases, the person to whom the *rapport* has been transferred has to retransfer the patient to the hypnotist.

Perception of Time.—It is very curious in many cases to notice what correct ideas of time are entertained during hypnosis. For instance, if a patient is told to waken in forty-

five minutes, the hypnotist himself will be utterly at a loss to measure this period without frequent reference to his watch or a clock, but the subject will very often waken to the minute.

Effects on Menstrual Functions.—One of the most difficult assertions in connection with hypnotism for us to accept is that the menstrual functions can be modified by suggestion made during hypnosis.

When Dr. Auguste Voisin told the British Medical Association that he had been able to cure menorrhagia and amenorrhœa by means of this agency, the audience laughed, but did not believe him.

However, his testimony is supported by that of other observers, and I have myself repeatedly seen cases of profuse and painful menstruation in which hypnotic suggestion was followed by painless and perfectly normal catamenial periods.

Consciousness.—It is a very prevalent opinion that a person is absolutely unconscious during hypnosis, but this is certainly very far from being correct.

It must be borne in mind, in dealing with this point, that by hypnosis we mean every condition in which there is a heightened receptivity of suggestion.

Now, we have seen that a great many patients can detail minutely everything that has occurred during their hypnosis, and can give a very clear description of their own feelings. It is manifest that such people are conscious.

In others, once the hypnosis is over, the memory is hazy, in some it is altogether absent; but to any careful observer there is abundant evidence of consciousness, though it may be different from ordinary consciousness. Thus in the case of somnambulic patients, you can get intelligent answers to your questions; they can describe what they see, and act with good judgment, even in suggested hallucinatory situations. If you make a somnambulist believe he is in danger from some source, he will at once take suitable steps to avert the peril. It is clear he is not in his ordinary conscious condition, or he would recognize the falsity of the suggestion; but he is certainly conscious to some degree, or he would not protect himself.

If a patient is made to believe that he has cut his finger, he will see the blood flowing and feel the pain: so he is as-

surely not in this waking condition of consciousness; but is it not equally conclusive that, when he gets out his handkerchief to staunch the bleeding and bind up his finger, he is not *un*conscious?

Another very striking proof of consciousness during hypnosis is that a patient, even when profoundly somnambulic, will generally resist any suggestion which is repulsive to his feelings. I have frequently seen a person, in whom I have been able to produce all sorts of paralyses, pains, hallucinations, and illusions, completely wakened by the command to do something which was contrary to his natural inclination, and this in cases where there was not the slightest recollection of a single item that had occurred while hypnotized.

Yet another proof of consciousness is found in the fact that many somnambulists are quite aware that they are hypnotized, and will explain to you that they know very well that they are not awake.

Dehypnotization.—When it is desired to end the hypnosis, the methods to be adopted are very simple.

In by far the majority of cases, the simple suggestion to awake, or that the sitting is over, is quite sufficient to determine the condition.

In the lightest forms of hypnosis, it is hardly correct to speak of wakening, for sleep is not really present.

Sometimes the arousing is sluggish, and then fanning the face is useful, or the command "Waken up!" may be repeated.

If Braid's method of inducing hypnosis has been used, it may occasionally be necessary to give the patient a light shock, such as a slap on the arm.

In many cases it is easy to arouse the patient by telling him to rouse up in ten minutes, or at any other fixed period.

In other cases it can be suggested that the patient will be thoroughly awake at any given sign, such as when the door is opened, when the operator coughs or counts up to ten, or when the subject himself counts a certain number.

Sometimes, if a patient is told to count ten, but wake up when he gets to five, he will do so, but continue, he knows not why, to count until ten is reached; others stop the moment they get to five, and it is curious to see the sudden return to full consciousness, with the lips shaping to count the six.

The methods of awakening can be varied greatly, and are often very interesting.

Some patients are fully awake instantly, others take a few seconds to regain their normal condition. They sometimes yawn and rub their eyes, as if awakening from an ordinary sleep.

I only once saw a patient take more than a few seconds to be quite himself again. It was the first time this gentleman was hypnotized. He came to me for the purpose, and speedily became deeply affected. When told to waken, he at once opened his eyes and looked around, asked where he was, and how and why he had come. In two or three minutes he remembered everything up to the point of going to sleep.

I have never yet had the slightest difficulty in ending hypnosis, nor have I ever met with any medical hypnotist who has, though there are numerous cases on record where amateurs were not able to put an end to the condition which they had produced.

Natural Termination of Hypnosis.—A hypnotized person will always waken naturally if left alone, though the length of such undisturbed sleep varies greatly. As a rule, patients will waken in about fifteen to twenty minutes, but cases are on record where the sleep has lasted eighteen hours.

Condition after Hypnosis.—It is important to know how a person feels after his hypnotic rest is over.

Generally he will tell you, if questioned, that he feels warm and comfortable, and it has often been my experience to be reproached for rousing patients from what they describe as a state of perfect calm.

They often say they feel as refreshed after five or ten minutes' hypnotic rest as if they had had a night's sleep.

It is not uncommon for subjects to feel stronger at the close of the hypnosis than when they began.

Occasionally there may be slight headache or giddiness, with a sensation of chilliness, and complaints the next day of not having slept well.

It must not be overlooked, however, that a patient's feelings on awakening can be greatly modified by suggestions offered during hypnosis, and, that being so, any unpleasant symptoms may be avoided. No experienced hypnotist would think of concluding a hypnotic sitting, whether undertaken

for experimental or therapeutic purposes, without some general suggestions, such as: "When you waken you will feel perfectly well; you will be comfortably warm, free from headache and giddiness, and will be much better for the rest you have had. You will sleep better than usual to-night."

I have now given a very imperfect outline of some of the leading phenomena to be observed during hypnosis. I have not pretended to arrange them in any order of appearance, for they are very erratic in this respect. Neither have I attempted to divide them, as is often done, into (*a*) physical and (*b*) mental. My object has simply been to acquaint the reader who has not hitherto studied hypnosis with the lines on which he must work if he is anxious to master its various manifestations.

One phenomenon I have purposely not included in the above sketch, namely, "lethargy"; but we will now briefly consider it.

Lethargy.—The reason why I have not referred to this subject when dealing with the phenomena of hypnosis is that it is a condition which is practically unknown except to Charcot and his pupils.

Liébeault, Bernheim, Moll, and other accomplished hypnotists are not familiar with it.

A form of lethargy was often referred to by the older "magnetizers" where the patient seemed to be wholly unconscious, and incapable of being wakened, but recovered after a long period spontaneously.

Charcot maintains that during lethargy the subject is totally unconscious, but that the condition is absolutely and easily distinguishable by what he calls its "neuro-muscular hyper-excitability." He declares that "if sufficient pressure be made upon a nerve or muscle" in a lethargic patient "the corresponding segment of a member assumes a fixed posture, which is in all instances the same," and this he considers is the essential feature of lethargy, which is, however, further characterized by complete anæsthesia.

For the better understanding of the want of agreement on this point, it will be necessary to consider the differences between the—

Two Great Schools of Hypnotism.—Much confusion has arisen, not only in the profession, but also in the public mind,

owing to lack of knowledge concerning the two schools of hypnotism, which renders it impossible to reconcile the very conflicting reports on the subject. Thus, one hypnotist declares that hypnotism is dangerous and a sign of disease, while another as confidently asserts that it is only beneficial, and a high road to health.

Let us try to fathom this.

The two camps which hold such diametrically opposed opinions are, respectively, the Paris school, dominated by Charcot, and the Nancy school, founded by Liébeault and now also represented by Bernheim. A very cursory glance at one of Charcot's latest publications reveals in a few words the reason for the difference between him and his disciples on the one hand, and Liébeault and his converts on the other.

Charcot's School.[13]—Charcot says, "At the very outset, my studies dealt with hysterical women, and ever since I have always employed hysterical subjects." (All these "subjects" were women. This confession is further elucidated by Binet and Féré, who were present at Charcot's investigations, and tell us that if we wish to repeat them it will not do to select simply "hysterical subjects," but it is essential to secure subjects suffering from "epileptic hysteria," the only class employed in these experiments.)

To my mind this admission renders the whole of his laborious investigation a specialty, as it were, in the study of hypnotism.

With the greatest possible respect for Charcot, who is admittedly one of the foremost scientists of our day, I must say that in my opinion he has never as yet fairly experimented in the wider or Nancy hypnotism.

If one wanted to test the properties of some new antipyretic, it would not be an exhaustive investigation to experiment with patients whose temperature was already subnormal; nor would it be a fair trial for a new sedative to give it to a man whose system was at the time loaded with morphia.

Charcot has only studied hysterical hypnotism, and, this being so, it is not altogether a matter for surprise that he comes to the conclusion that it is dangerous and of no practical value, that hypnosis is in itself a neurosis.

As far as I know, Charcot has never yet made an effort to use hypnotism therapeutically, but seems to have been con-

tent to create striking effects before his semi-public audiences.

What, then, do Charcot's observations amount to? Simply this: that in certain very exceptional cases of acute hysteria he has succeeded in developing certain phenomena, which he divides into three stages:

(1) *Lethargy.*—Produced by fixing the eyes upon a shining object. It is a state of "absolute unconsciousness," in which the eyes are closed and the subject neither sees nor hears, but displays the "neuro-muscular hyperexcitability" already referred to.

(2) *Catalepsy.*—This stage is brought about by simply opening the eyes of the lethargic subject widely with the fingers.

Its characteristics are that the eyes remain open and staring, the subject remaining "wholly unconscious"; the muscles can no longer be excited by direct pressure, but have now the property of retaining whatever attitude may be given to the members.

There is also present a peculiar unison of attitudes and facial expression—the patient clenching her fist if the face muscles which express anger are made to contract by electricity; and conversely the face will assume the appearance of violent anger, if the fists be clenched, and made to adopt a threatening attitude.

(3) *Somnambulism.*—The cataleptic patient passes into this third stage if the top of her head be briskly rubbed, and now is for the first time said to be in mental connection with the outer world. She can keep her eyes open or closed at will; she often looks as though she were awake; she answers questions. Her muscles can now be made to contract by merely grazing the skin overlying them, or by making passes, even at a distance, along their course.

These are the three famous stages of Charcot, which together constitute what he calls the "*grand hypnotisme,*" in contradistinction to the "*petit hypnotisme*" of Nancy.

Charcot considers this *grand hypnotisme* to be a genuine neurosis.

Binet and Féré also say that only about a dozen of these subjects were to be found in the Salpêtrière in ten years.

Charcot's experiments, then, lose much force when it is

borne in mind that they have all been made in these very exceptional cases.

It is curious to note that Braid made some very similar observations: "The first symptoms of the hypnotic state are extreme excitement of all the organs of sense, sight excepted.

"By allowing a little time to elapse, he will lapse into the opposite extreme of rigidity and torpor of all the senses.

"At this stage, a puff of wind directed against any organ instantaneously rouses it to inordinate sensibility, and the rigid muscles to a state of motility."

The Nancy School.—Liébeault and his followers, instead of confining their work to hysterical women, take, without selection, men, women, and children of all classes, and maintain that hypnosis, as they understand it, is not a neurosis, but a condition very much akin to drowsiness, ordinary sleep, or somnambulism, according to its intensity; that the majority of the people can be hypnotized, and that hypnotism is a useful remedy.

The three stages of the Salpêtrière are unknown in Nancy, Liébeault never having met them in the thousands of patients he has hypnotized during thirty years. Bernheim too has carefully searched for them, but failed to find them.

Though I do not for a moment compare my experience with that of these observers, I can only say that I have followed all Charcot's rules, except one, time after time, and never yet succeeded in detecting the three stages. The one rule that I have not adhered to has been that I have not experimented in any hystero-epileptic case.

I do not deny that Charcot's reports are strictly accurate, but I cannot see that they are of much utility to the practical physician.

Another great difference between the schools is that while the great Paris scientist merely uses hypnotism as a clinical demonstration of a neurosis, the Nancy doctors use their form of hypnotism solely as a therapeutic agency. (In justice to Charcot, I must mention that he has lately stated that "suggestive therapeutics" [*i.e.*, the Nancy method] may be looked to for good effect in hysterical phenomena.)

CHAPTER IV.

WHO ARE SUSCEPTIBLE?

HAVING now got a general idea of what hypnosis means, and of its leading phenomena, as well as of the methods to be employed for its production, let us see who can be hypnotized.

It is difficult to say precisely who can be influenced. Some writers contend that very few people can be affected. I have heard professional "mesmerists" declare that only ten per cent are capable of being hypnotized.

Bottey thinks about thirty per cent.

Morselli places the proportion at seventy per cent.

Delbœuf maintains that eighty per cent can be reduced to a state of hypnosis.

Braid once succeeded, at a private lecture to the profession in London (1842), in hypnotizing sixteen out of eighteen adults, mostly entire strangers to him.

Dr. Tuckey states it as his opinion that ninety per cent may be hypnotized, and this percentage is claimed by many Continental hypnotists.

Drs. Van Renterghem and Van Eeden assure me that they succeed in ninety-five per cent.

Gregory believed that every person could be hypnotized.

In 1880 Dr. Liébeault drew up the following table:

RESULTS OF EXPERIMENTS IN 1,012 PERSONS.

Drowsiness,	33
Light sleep,	100
Deep sleep,	460
Profound sleep,	230
Light somnambulism,	31
Deep somnambulism,	131
Unaffected,	27
	1,012

Speaking, then, broadly, and including every degree from the lightest to the most profound, it seems evident that by far the majority of persons may be hypnotized.

One point should not, however, be overlooked in making estimates of susceptibility—*i.e.*, the number of trials which are made to induce hypnosis.

We are not told, for instance, how many experiments were made with Liébeault's 1,012 patients, but I feel certain that so high a percentage (over ninety-seven per cent) could only have been attained by great perseverance; certainly, when I studied at Nancy, I saw M. Liébeault fail with a much higher percentage on first trial.

Drs. Van Renterghem and Van Eeden admit that great persistence is required to reach their standard.

I would content myself by saying that on a first trial probably six out of ten average patients can be hypnotized, but that repeated trials will result generally in eight out of ten becoming hypnotized.

It is quite possible that if the remaining two patients were persevered with, one, or perhaps both, might in time succumb.

The circumstances of the experiments must also be reckoned.

Most of my trials have been made in my private study, and generally in the presence of only one witness.

If, however, a number of spectators were present, I have no doubt that the consequent nervousness would prevent success in many cases.

Influence of Sex.—It is a very common belief that only women are susceptible, but actual experience proves that sex has very little, if any, effect in this direction.

Constitution and Mental Capacity.—It is frequently held that only weakly persons will yield to hypnotism. This is certainly an error, and it will often be found that athletic persons are among the easiest to affect.

Another common mistake is to assume that only hysterical or weak-minded persons are good subjects. (If this were true, we would be forced to admit that about eighty per cent of us were weak-minded.) So far from being correct, this idea will be found in practice to be the very reverse of one's experience.

Hysterical women are generally most obstinate, whereas intellectual people, with well-balanced minds, are often readily influenced.

Nor is this to be wondered at. Seeing that intelligent co-operation is an essential, it will easily be understood that a silly girl, whose thoughts are constantly wandering to her new dress or a coming dance, can hardly be induced to suffi-

ciently concentrate her attention to give you her co-operation; whereas, on the other hand, the intelligent person has his or her thoughts under control, and so will, by excluding disturbing ideas, give the operator the benefit of good-will.

The imbecile or lunatic is hardly susceptible at all.

True, Voisin succeeded with ten per cent of his insane patients, but he often spent as much as three hours at a time on a single patient.

With some people of the very highest intelligence, however, great difficulty is experienced.

They take such an active interest in the experiment that they, as it were, stay awake to see if they sleep, or watch the whole process in an analytical mode, wondering what will be the first sign of hypnosis, and how the next step will manifest itself. Until such patients can give themselves up wholly, they are not likely to be hypnotized.

Phthisical patients are constantly found to be among the best subjects.

Age certainly has a very great influence on susceptibility, children being especially good subjects; whereas old people, though not wholly unsuitable, are distinctly more refractory.

Infants are not generally thought to be capable of being hypnotized, though Liébeault thinks gentle stroking of their limbs will produce a kind of hypnosis; it certainly will induce sleep, just as the rocking of the cradle will.

Braid once took thirty-two school children and hypnotized the whole of them in twelve minutes.

M. Beaunis has published a most instructive analysis of Liébeault's table, referred to above.

Age.	Somnambulism	Profound Sleep.	Deep Sleep.	Light Sleep.	Drowsiness.	Unaffected.
Up to 7 years.....	26.5	4.3	13.0	52.1	4.3	.0
From 7 to 14 years	55.3	7.6	23.0	13.8	.0	.0
" 14 to 21 "	25.2	5.7	44.8	5.7	8.0	10.3
" 21 to 28 "	13.2	5.1	36.7	18.3	17.3	9.1
" 28 to 35 "	22.6	5.9	34.5	17.8	13.0	5.9
" 35 to 42 "	10.5	11.7	35.2	28.2	5.8	8.2
" 42 to 49 "	21.6	4.7	29.2	22.6	9.4	12.2
" 49 to 56 "	7.3	14.7	35.2	27.9	10.2	4.4
" 56 to 63 "	7.3	8.6	37.6	18.8	13.0	14.4
Over 63 years.....	11.8	8.4	38.9	20.3	6.7	13.5

M. Liébeault has more recently prepared a list of 2,534 subjects hypnotized by him, showing that of that number, 385 were somnambulists; this is 15.19 per cent, or one in 6.58. (Bernheim's "Suggestive Therapeutics." 2d Edition.)

From this table it will be seen at once that children from seven to fourteen years of age yield the largest proportion of somnambulists, and that practically there are no subjects in this period who may not be more or less influenced.

Race.—It was for a long time supposed that only certain races could be hypnotized, and some writers in England flattered themselves by saying that, while Esdaile's almost universal success in India on the natives was not surprising, and the general susceptibility of the French was only to be expected, it would be found that John Bull was much too stolid to be affected.

Actual experiments seem to show that all nations are very much alike, though possibly the Orientals are the most deeply influenced.

How to Foretell Susceptible Persons.—One is constantly asked if it is possible to say beforehand, in any given case, whether a person can be hypnotized or not.

As yet no satisfactory data have been formulated, but I cannot help thinking that experience begets a sort of instinct by means of which the hypnotist can generally arrive at a pretty accurate conclusion.

Liébeault thinks that persons who are imaginative and easily impressible are good subjects.

Dr. Ochorowicz advises the use of his "hypnoscope" as a preliminary test of susceptibility. It is a ring-shaped magnet, which is placed on the finger of the person to be tested; if in a short time he feels the finger stiff or numb, or is conscious of any other peculiar sensation, he is held to be a suitable subject. This seems to me a very unsatisfactory method; for, as Dr. Hack Tuke has reminded us,[14] most people will find that if they simply look attentively at one of their fingers for a few moments, they will become aware of some uncomfortable sensation, such as cold, heat, tingling, or "pins and needles."

Besides, a trial of the hypnoscope will not occupy a shorter time than our actual attempt to produce hypnosis.

To my mind, seeing that it is possible to influence by far the majority of one's patients, the more important point is how to tell beforehand who will belong to the refractory minority.

Who Can Hypnotize?—This is a question of greater im-

portance, but at the same time, perhaps, admits of a readier answer.

Broadly, any one can be a hypnotist; but, to quote Professor Gregory, "Every one possesses the power to hypnotize others, though in variable degrees."

There seem to be certain qualities which go a long way toward insuring success; just as in every-day life some people seem naturally to attract us, and by their very appearance to inspire us with confidence, while others repel us and arouse our suspicions.

One medical man has the happy art of raising his patient's spirits, and making him feel better, by the very manner of his entry into the room; another has the misfortune to depress his patient, and make him magnify his symptoms, before ever a word has been exchanged.

In hypnotism, it will be found that the man who at once begets in his patient a feeling of trust and safety has already the most essential qualification for success; and this quality is more necessary for the hypnotist than the physician, who does not leave the old lines of treatment, for the reason that at present there is such widespread ignorance, almost amounting to dread, on the part of the laity in reference to hypnotism.

Confidence in himself is another point which contributes largely to success; for if the patient detects any indecision or nervousness on the part of the operator, the feeling quickly becomes contagious, and will overcome any amount of trust in the general ability and integrity of the doctor.

Confidence in the treatment is also a great help to the doctor, for many patients declare that they themselves have no faith whatever in the new-fangled agency, and consider it sheer waste of time to try it; if to this scepticism the doubtful opinion of the doctor is added, there is hardly likely to follow a fair test of hypnotism.

I do not mean that we should assure our patients that the treatment will cure them—far from it; but we should at least be emphatic in declaring that we have good ground for thinking that the treatment may be followed by benefit.

CHAPTER V.

TREATMENT DURING HYPNOSIS.

THE treatment by means of hypnotic suggestion may be conveniently discussed under two heads: medical, including midwifery, gynæcology, moral perversions, and lunacy; and surgical.

MEDICAL TREATMENT.

General.—Hypnotism seems to offer a wider field of applicability to the physician than to the surgeon; and the practical point for us to consider here is, the kind of cases in which it is likely to be of any service.

As yet, few have been bold enough to attempt to define the limits within which the physician may find hypnotism worth a trial.

Charcot, it is true, seems to think it cannot possibly be hoped to do more than ameliorate hysterical ailments; but this view is by no means accepted by those who have seriously employed it as a remedial agent.

Something like a clew can be got from a consideration of how vast an influence is wielded by the mind over the body.

Dr. William Stokes, in his classical work on the "Diseases of the Heart," gives due weight to this factor in the cure of disease.

He pointed out how recovery is often retarded by depressing emotions, and, in dealing with cardiac neuralgia, says, "One of the most certain remedies consists in removing from the patient's mind the apprehension that his heart is organically diseased."

Trousseau, in his "Lectures on Clinical Medicine," recalls the famous experiments of Claude Bernard (Claude Bernard's experiment has, of course, no direct bearing on hypnotism, further than showing that the brain is really the seat of some diseases which were formerly supposed to originate elsewhere;

and that being so, we may be able through the brain to modify some of the symptoms of these ailments) to show the intimate connection between the floor of the fourth ventricle and the development of glycosuria, and that between other cerebral areas and polyuria or albuminuria.

He also points out how neuralgia excites the secretion of neighboring glands; how the passions and intellectual engrossments affect secretion; how mental disturbance will increase micturition; anger modify the lacteal secretion; fear produce diarrhœa; and impresses the fact that the whole digestive system, including the liver and pancreas, may be affected by the mind.

Graves, too, in his "Clinical Lectures on the Practice of Medicine," enforces the importance of what he terms the "power of moral impressions" in aiding the cure of disease.

Sir James Paget, in his "Lectures on Surgical Pathology," directs special attention to the effect of mind upon nutrition, and says, "There is scarcely an organ the nutrition of which may not be affected by the mind."

He cites a very telling case of a patient who consulted him about a tumor in her breast, which she believed to be a cancer. Paget boldly assured her that it was not malignant, and, further, that it would speedily disappear. The latter portion of his statement he hardly expected to see fulfilled, but he reports, with apparent surprise, that it began to shrink immediately, without either internal or external therapeutic treatment.

Dr. Henry Maudsley,[15] in dealing with the same point, reminds us of what is often observed by army surgeons, that the excitement of battle frequently prevents a soldier perceiving that he has been shot or received a sabre cut; such wounded men will often continue fighting until they faint from unnoticed loss of blood.

Dr. Hack Tuke[16] tells us that "the mere concentration of the mind may excite the action of some parts and lower that of others."

These quotations not only serve to give us an indication of the direction in which we may hopefully look for satisfactory results from the employment of hypnotic suggestion, but serve to explain the rationale of the treatment, and furnish a powerful argument in favor of its having at least a fair trial.

If, as some writers state, it is true that the mind has such a powerful effect on the body that impressions made upon it in the wakeful condition may increase, diminish, or otherwise modify secretions, promote or retard recovery, and obliterate or exaggerate pain, is it not reasonable to suppose that when we induce hypnosis, and so bring the brain into a state of exalted receptivity, we may be able so to heighten and intensify its influence on the body as to bring about the very changes we desire, hastening absorption, promoting secretion, or annihilating pain?

I think, then, we may fairly start by saying that it is clearly justifiable to employ hypnotic suggestion in all cases where a distinctly nervous element can be detected.

These cases will be found to cover a wider field than perhaps appears at first sight. It is surely within the experience of every physician that many of the most distressing ailments, which make themselves known by physical symptoms, are often directly due to mental conditions. Who has not seen diabetes apparently directly follow worry; gout determined by anxiety; or eczema seem to originate as a consequence of mental depression?

Then consider the host of diseases, which are grouped promiscuously under the title "nervous," for want of a better definition; the neuralgias, insomnias, dyspepsias, palpitations, hysterias, neurasthenias, etc., etc. These alone would furnish scope enough for the most avaricious practitioner.

Again, we may say that the area with which we started covers every affection which is accompanied by pain, though in maintaining that we are justified in trying hypnotic measures in every case where there is pain, I do not mean it to be supposed that the mere removal of suffering is synonymous with the cure of its cause. But we all know that opium, by its action in lulling pain, very often materially assists in the cure of diseases, of which such suffering is merely a symptom. Pain is, however, sometimes so formidable a symptom that it is sufficient to exhaust the patient, or, where lesser in degree, it may, by prohibiting sleep, disturbing the appetite and digestion, and constantly forcing itself upon the attention of the invalid, produce such a morbid depression of spirits that his recovery is very much delayed.

If hypnotism is found to act as a kind of moral or mental

opiate, giving refreshing sleep, freedom from pain and anxiety, it may become at least a useful adjunct to medicinal treatment in cases where it is not sufficient to produce cure alone.

Hypnotism may also be accorded a trial in all functional disorders.

These are such sweeping assertions that I must distinctly repudiate any desire to put this treatment forward as a panacea or successor to our usual means of treatment.

I am anxious to be clearly understood on this point. I do not for one moment believe that all ailments, whether of a nervous or functional character, are amenable to hypnotic suggestion; but I do believe that it is justifiable to try this method, either alone or in conjunction with medicinal treatment, in these cases.

Probability of Success.—It is only to be expected that my readers may fairly demand to know what is the use of trying hypnotism; in other words, what is the probability of success?

I am wishful on this point to keep clear of anything resembling a dogmatic statement. What I want is to induce my readers to try the treatment for themselves.

I am by no means an enthusiast, but still a student of the subject, and all I at present feel disposed to state is that those who are actively engaged in hypnotic investigation are constantly being surprised at their seemingly beneficial results in the most unlikely quarters.

Among the ailments in which hypnotic treatment has been followed by (I leave for others the settlement of whether *post hoc* is here equivalent to *propter hoc* or not) relief or cure may be mentioned: rheumatism, muscular and articular; sciatica, tic, pleurisy, insomnia, headache, indigestion, spasmodic affections such as coughing and sneezing, eczema, writer's cramp, constipation, diarrhœa, anæmia, hysteria, hystero-epilepsy, gastralgia, stammering, enuresis, neurasthenia.

This list is by no means complete, but will perhaps be sufficient to show how varied are the ailments which come under the head of "medical" in which it may be useful to try hypnotic treatment.

In 1889 Drs. Van Renterghem and Van Eeden laid before the hypnotic section of the International Congress of Experi-

mental Psychology, held in Paris, a joint report of 365 cases of organic, mental, and neurotic ailments treated by them solely by hypnotic suggestion, with the following astounding results:

71 cases received no benefit.
92 cases received slight benefit.
98 cases received marked benefit.
104 cases were cured.

Midwifery.—It has been found in some cases, but of which few records have as yet been published, that hypnotic suggestion has seemed to completely obliterate the feeling of pain, without in the least diminishing the force of the uterine contractions.

It must be pointed out here that if it is desired to try this plan in any particular confinement, the patient should be familiarized with the process by a few preliminary sittings, before the time of actual experiment; for if it is left until labor has begun, it is hardly likely that the attempt to hypnotize will succeed at all.

Gynæcology.—Certain derangements of the menstrual functions have appeared to be corrected after hypnotic treatment.

The recital of some such apparent successes by Voisin before the British Medical Association in 1889 was openly received with incredulity; and when he told his hearers that he had been able to fix beforehand the date of the onset of menstruation in cases of previously marked irregularity, he was, to quote an eminent Scotch physician who joined in the subsequent discussion, "politely, but none the less plainly, told that his hearers did not believe him."

Nevertheless, I have frequently seen cases of very painful menstruation, where hypnotic suggestion, without any other treatment, was followed by absolutely painless periods; and others, in which profuse periodic flooding was changed into completely normal menstruation, or amenorrhœa gave place to regularity.

I have also seen cases of acute and chronic ovarian pain permanently relieved after hypnotic treatment; and in one case in which oöphorectomy had been recommended by one of our foremost gynæcologists as the only means of escape from perpetual invalidism and suffering, a few hypnotic sit-

tings were followed by an absence of pain, and an ability to resume regular work.

Lunacy.—In the treatment of insanity, there are many difficulties in the way. First of all, it is very hard to overcome the suspicion of the patient, which may lead him to violent opposition.

Voisin relates that some of his patients had to be restrained by five or six attendants.

The time necessary to produce any hypnotic impression is also a serious hindrance. Voisin often spent as much as three hours in attempting to hynotize a single patient.

By very great patience, Voisin, Forel, Dufour, and Burckhardt, however, succeeded in hypnotizing about ten per cent of the patients they experimented on, and report that the treatment was successful in cases of acute mania, hallucinations, suicidal insanity, and melancholia.

I have seen melancholic patients who contemplated suicide, and wandered about all day as if possessed of an evil spirit, become bright, cheerful, and active after hypnotic treatment.

But I have not myself had any opportunity of trying hypnotism in any cases which might be called developed insanity.

Drs. R. Percy Smith and A. T. Myers conducted a series of experiments in Bethlem Hospital in 1889, but were not able to record any very decided successes.

Moral Ailments.—Under this heading may be included what is commonly spoken of as "dipsomania," but which may perhaps more correctly be styled inebriety, morphinomania, cocainomania, and all the other manias connected with stimulants or drugs; kleptomania, thieving, lying, masturbation, etc.

At first sight, it may appear absurd to speak of employing hypnotic treatment to cure drunken habits, but until we have fairly tested its claims we cannot wisely set aside, as of no value, the evidence of men like Liébeault, Bernheim, Voisin, Forel, and many others, who assure us that hypnotism has in their hands been followed by sobriety where inebriety was the rule before.

Of course it is asserted against such evidence that there might be some temporary cessation of inebriety in a few cases, which has been mistaken, by these advocates of the

treatment, for cure, but that it is certain there would be relapses of a more serious nature.

However, it is not for us to jump to conclusions. We must carefully weigh the evidence *pro* and *con.*, and supplement that which is in existence by fresh investigations.

What is said of inebriety will also hold good for the other ailments or perversions referred to above.

It certainly does seem to me little short of miraculous if, by means of verbal suggestion during hypnosis, we can eradicate vicious habits which have become ingrained into a man's very nature by long indulgence; but we must not affirm that a thing is impossible because it seems improbable.

When Harvey announced his views as to circulation of the blood, most people said he was mad; that such a theory as he propounded was wholly impossible.

When Stevenson said to the House of Lords that he could make a train travel at the rate of twenty miles an hour, some of his noble hearers declared him a fool; but when he told them that he could increase the speed to thirty miles an hour, they cried out that he was a dangerous lunatic, and were for placing him under restraint.

We have so often cried "impossible," and lived to see our error, that nowadays we adopt more guarded language, and content ourselves with saying, "It may be so, but it does not seem likely."

For my own part, I can only say that I have treated inebriates by means of suggestion, and seen positive aversion to alcohol follow; and in one case of an apparently established habit of lying and thieving, I have seen truthfulness and honesty as apparently rooted after a few hypnotic sittings.

Some Further Possibilities.—The consideration of what has already seemed to result from hypnotic suggestion leads us naturally to take a look into the future, to see if we can predict in what other regions explorers are likely to come on hidden treasure. I am not sufficiently skilled as a hypnotic mineralogist to say precisely what mines are likely to yield the richest ore, but will merely attempt to indicate a few which may repay the sinking of a shaft of investigation.

Nowhere, to my thinking, is the effect of mind upon matter so forcibly illustrated as in those painful results produced on the fœtus *in utero* by what we call "maternal impressions."

It seems to me that it would at least be worth trying if, in any case where there was reason to apprehend that a sudden shock to the pregnant woman might result in some horrible deformity in her offspring, we could counteract such effect by suitable suggestion.

The medical men of past generations paid such attention to the possible effects of suggestion (without hypnotism) on the mother that, in the case of wealthy dames who were anxious that their children should be good-looking, they used to surround them with beautiful pictures, etc.

Another question awaiting solution is, May hypnotic suggestion overcome certain forms of sterility?

I think, too, certain cases in which the removal of the ovaries seems called for, to relieve pain, should be given a trial by means of hypnotic treatment before such a desperate operation is undertaken.

The constantly increasing number of railway collisions leads me to urge that, in all cases suffering from the nervous shock consequent on such accidents, an attempt might be made to determine whether the distressing symptoms often present—the insomnia, frightful dreams, pains, and constant apprehension—could be in any way minimized.

It frequently happens that in some of the very worst cases there is an interval of several days of comparative health between the accident and the onset of collapse.

I would very much like to see this time made use of for hypnotic experiments.

Perhaps railway directors will take the hint; it might lead to less serious illness for the passengers, and less drain on dividends, by way of compensation, for the shareholders.

Many other departments in which experiments may profitably be made will strike individual readers.

As an educational factor, the influence of hypnotism seems worthy of consideration.

Durand declared in 1860, "Braidism provides us with the basis of an intellectual and moral orthopædia."

Liébeault relates how a lazy boy was so transformed by one sitting that he soon became the head of his class.

Berillon also advocates hypnotic suggestion as an aid to industry in some cases, but chiefly as a means of overcoming the bad habits of children.

I will only refer to one other department.

Would it not be well for those who have the opportunity, in their capacity as prison and reformatory doctors, to try, on an extended scale, if hypnotism can be called to the aid of the criminal machinery of the country?

From what I have seen myself, I am most anxious that serious and systematic investigation on this point should be undertaken, with full official sanction.

The government not only lent its approval to the experiments of Esdaile in India, with hypnotism as an anæsthetic agent, before the introduction of chloroform, but placed a special hospital at his disposal for his greater convenience.

Is it too much to ask that our government would at least countenance and facilitate the trial, in the various institutions already in their control, of a treatment which it seems possible might be found to diminish the number of criminals in the country?

At present it is the opinion of many who seem competent to judge, that the juvenile offender who crosses the threshold of a reformatory, leaves it ready for matriculation at the jail; and there are those whose experience leads them to conclude that, once the entrance examination is passed for the latter establishment, there is great danger of the prisoner becoming utterly callous, a mere prey upon society, whose hand is against every man.

Who has not read the sad records of men and women who had spent the most of their years in prison?

An attempt to implant honest intentions into the minds of the young generation of criminals could do no harm, and might lead to satisfactory results; and even in the case of adult offenders, there seems to be much to commend a fair consideration of the subject.

Surgical Treatment.

We may at once clear the ground by saying that no serious attempt is now made to enter hypnotism in competition with chloroform, ether, or methylene bichloride as an anæsthetic in surgery.

Before the introduction of these agents, however, hypnotism had rendered great service to the surgeons who were willing

to try it, and we have already referred to the painless operations of Esdaile, Braid, Velpeau, Broca, Liston, and others. But the great disadvantage of hypnotism, as compared with chloroform and its congeners, is its uncertainty. Practically every patient can be rendered insensible to pain by means of these anæsthetics, whereas only a limited number can be so influenced by hypnotism.

Professor Bernheim may, however, be taken as expressing the views of the present-day hypnotists when he says "hypnotism cannot be generally used as an anæsthetic in surgery; it cannot replace chloroform."

But though it is readily conceded that in hypnotism we have not a universal anæsthetic, I do not think it should be altogether disregarded in the operating-theatre; and if I knew beforehand that any given patient would pass into a profound stage of hypnosis, accompanied by complete insensibility to pain, I would not hesitate to perform any major operation, which might be necessary, during such hypnotic sleep; for whatever the shortcomings of hypnotism may be, it has one strong point in its favor whenever it can be used—*i.e.*, that in skilful hands it has never yet been known to cause any fatal accidents; whereas it is no exaggeration to say that chloroform has slain its hundreds, in spite of the greatest expertness of the administrators.

While I write this, our most powerful medical journals are deploring the number of fatal mishaps due to chloroform and ether, and calling on all practitioners, who are unfortunate enough to experience such catastrophes, to report them, so that we may accurately gauge the extent of the danger of these agents. ("Anæsthetics have lately been running up a little 'butcher's bill' of their own, which is beginning to excite some alarm" ["British Medical Journal," January 3d, 1891].

"We recorded last week reports which had come under our notice of inquests published in local country papers, of cases of deaths under anæsthetics, of which no medical details have been forwarded to us, and which appear therefore to be likely to escape record in the medical journals" ["British Medical Journal," January 10th, 1891].

The article then goes on to give an account of another death from ether.

"In recording more deaths from this anæsthetic—chloro-

form—we must repeat, what we have before urged, that more systematic accounts of such occurrences should be given. Of the deaths recently reported it will not be necessary to detail all." Then follow details of: 1, A death under chloroform, at St. Mary's Hospital, in a case while a finger was being amputated; 2, the death of a healthy lad aged nineteen, "under chloroform" preliminary to an operation for the removal of a necrosed bone from the leg, in the Wolverhampton General Hospital; 3, the death of a man aged forty-six, in the Guest Hospital, Dudley, in whose case "one drachm of chloroform" only was used; "an operation on the arm" was begun, but had to be stopped in two minutes, owing to the heart's action having ceased ["Lancet," January 10th, 1891].)

There are sometimes present exceptional circumstances, such as great prostration or heart disease, which make even the boldest surgeon hesitate to administer chloroform.

In such instances it seems reasonable to claim that hypnotism should at least be accorded a trial.

Quite recently Dr. A. B. Shaw, of St. Louis, was called upon to trephine in a case of traumatic epilepsy; he found the patient suffering from cardiac and renal disease, and considered the ordinary anæsthetics out of the question. Hypnotism was employed, and the operation was painlessly and successfully performed by its aid.[17]

Yet another situation in which it may be worth while to remember hypnotism. Suppose yourself unexpectedly called upon to perform some operation, while you are in a remote part of the country, and out of reach of your house; in such circumstances, a penknife has often had to do duty for a whole case of instruments, and has many a time rendered a good account of itself; if, however, you could succeed in inducing hypnotic anæsthesia, both your penknife and your patient would be placed at a great advantage.

However, putting on one side major surgery, there are many minor operations, such as tooth extraction, stitching wounds, setting simple fractures, etc., in which we seldom use chloroform; in these at least, hypnotism deserves a chance.

Dr. Hewetson, of Leeds, largely adopts hypnotism as a means of procuring anæsthesia in ophthalmic surgery.

But now we must consider another property which it is alleged hypnotism possesses in certain cases. Not only is it

claimed that anæsthesia can be produced, but a more or less continuing analgesia may be secured. My meaning will be best gathered from an illustration. Professor Delbœuf, of Liége, produced by means of caustic, two burns, one on either arm, in the same patient, and of exactly similar extent and severity; he then hypnotized the patient, and suggested that one burn should run a perfectly normal course, whereas the other should remain painless and heal sooner than its fellow. They were both dressed in precisely the same way, but one continued painful and was slow to recover; the other was never even uncomfortable, and was quite well ten days before the painful one.

This experiment seems to have been needlessly cruel, but we are not responsible for that; it tends to show, however, that at least in some cases the pain of such wounds as one sees every day in the accident wards of any large hospital may be banished, and consequently healing hastened.

I have myself seen similar results apparently follow similar treatment.

If further experiments justify this claim, hypnotism in this instance will have scored a point against all rivals; for no one can dispute that the effects of the ordinary anæsthetics are of very short duration.

I have already referred to the employment of hypnotism in cases of concussion due to railway or other severe accidents.

CHAPTER VI.

POST-HYPNOTISM.

This expression is by this time quite familiar, but yet there is sometimes a good deal of confusion about the meaning of it.

Some writers use it as though it were only applicable to cases of hallucination or illusion lasting after the actual hypnosis had ended, but this is not quite correct.

A few illustrations will best serve to elucidate this point.

Here is a man who is addicted to drink. I hypnotize him, and suggest, "After this sleep, you will detest every form of alcohol." He is then aroused, and, on being offered a glass of wine, rejects it contemptuously; if the case is wholly successful, he continues to shun his old enemy, and, when asked to account for the change, says he does not care to drink wine, etc., now.

This can neither be called an illusion nor a hallucination; it is a passive post-hypnotic impression.

I say to this young man, who is hypnotized, "When you waken you will find that your hair, which is now black, has become red." I then rouse him and tell him to look at himself in the glass. He is horrified to find the color of his hair changed!

This is an example of a post-hypnotic illusion, and is also purely passive.

To a third subject I say, during hypnosis, "To-morrow, at ten o'clock in the morning, you will go to the post-office and ask for the postmaster, to whom you will say, 'Good morning!' and at once return home."

The next day at the appointed time he sets off, and carries out the suggestion to the letter, without knowing in the least why he does so. This is an active post-hypnotic impression.

Many other examples of different post-hypnotic effects

could be given, but my object is simply to clear up our views of post-hypnotism.

Thus the varying classes of post-hypnosis must be separated.

There is a vast difference between a passive and an active post-hypnotic suggestion, and many subjects who are open to the one are not in the least amenable to the other. Thus I say to one of my patients, who suffers from insomnia, "At nine o'clock to-night you will fall asleep, and have eight hours' refreshing sleep." This suggestion is accurately fulfilled. But if I say to the same patient, "In an hour you will go to your friend B., and strike him on the back," no notice whatever is taken of the suggestion.

Some suggestions given during hypnosis may be made to take effect after a very long interval (*suggestion à échéance*, or deferred post-hypnotic suggestion).

Bernheim relates the case of an old sergeant to whom it was suggested that sixty-three days later he should go to Dr. Liébault's, where he would see the president of the republic, who would present him with a decoration.

On the day named, the sergeant went to the house of Dr. Liébeault, whom he knew well, but now took to be the president. Having bowed, he stood "at attention," and kept looking at his coat for the decoration; thinking he had received it, he once more bowed gravely, and left, looking a proud man.

The condition of such a patient at the time of such suggestion (active and hallucinatory) taking effect, seems to me to be one of fresh hypnosis.

Now, to my mind, we as physicians need concern ourselves very little with post-hypnotic effects, except in so far as they are curative. The experiments which only aim at producing hallucinations, or making a subject go aimless errands, have long been the stock in trade of showmen mesmerists, and may well be left in their hands so long as our legislature permits the giving of their public entertainments.

As medical jurists, however, we cannot afford to ignore this side of the subject, to which we will return when dealing with the medico-legal aspect of hypnotism.

From the physician's standpoint, I take it that hypnotic suggestion would be of little service but for its after-effects; for if relief was only coextensive with the actual hypnosis, its utility would be greatly limited.

The effects of suggestion made during hypnosis seem, however, to be of a very lasting character in many cases; and I think that wherever benefit seems to follow, it should, to be accurate, be called post-hypnotic, though hitherto such use has not been made of the term. I have known a patient, who had been a martyr to sleeplessness, to sleep soundly every night for a month, after one sitting. Again, I have seen a child who had contracted vicious habits completely transformed in character after a single hypnotic suggestion.

If it is right to ascribe such effects to hypnotic suggestion, it seems certainly as logical to speak of the effects as "post-hypnotic" as it is to call the impression that the color of the hair has changed so.

We should, then, I think, distinguish between—

Passive post-hypnotic impressions, which are curative.

Passive post-hypnotic hallucinations or illusions.

Active post-hypnotic impressions, which may, or may not, be curative.

Hypnotism by Correspondence.—One curious example of an impression becoming post-hypnotic is the production of hypnosis by correspondence.

If a person has already been hypnotized, it will often be found possible to suggest that a letter from the operator, or a telegram, will induce hypnosis.

Dr. Milne Bramwell, of Goole, recently gave a striking demonstration of this point to a number of medical men at Leeds.

He sent a young woman to the meeting with a letter for one of the gentlemen present. It was explained in this letter that an inclosed note was to be given to the patient, and the effect watched. She read the note, and almost instantly passed into a profound sleep, during which a dentist, who was in the company, was able to extract a decayed tooth, from which the patient suffered, without waking her; this was clearly the result of a former suggestion.

I have several patients who regularly use written orders, with which I have furnished them, as a means of insuring sleep; one of these subjects has employed such a note for over six months, without its ever failing.

Dr. De Jong, of The Hague, tells me that he often gives patients his *carte-de-visite*, having previously suggested that it will at any time produce sleep.

Any object, such as a ring, brooch, or pen-knife, could be thus made into a kind of talisman by means of suggestion.

Of course, even in a person who had not been hypnotized, hypnosis might occasionally be induced by written orders if the patient was told to look steadily at them, just as the same effect is brought about by looking at the operator's fingers or any other fixed object.

Auto-hypnosis.—Another subject on which there is a good deal of confusion of ideas is the self-production of hypnosis.

The terms "auto-hypnosis" and "spontaneous hypnosis" are often interchanged, as though they were synonymous, but there is a wide difference between the two, which should be clearly understood.

What is meant by auto-hypnosis is hypnosis voluntarily produced by a person, without the intervention of another.

Indian fakirs constantly practise this kind of hypnotism by fixing their eyes on some given object.

The red-skins, who have lately been giving so much trouble in Dakota, perform a kind of dance, which they call the "ghost dance," the descriptions of which read like a kind of auto-hypnosis. The performers dance wildly round a ring, until they produce a sort of insensibility, during which they gash themselves with knives, and finally they fall into a slumber, whereupon other dancers fill up the ranks.

The Omphalopsychics, or monks of Mount Athos, hypnotize themselves by looking steadily at their own navels.

Braid mentions patients who could readily hypnotize themselves by gazing at some object, or even by closing their eyelids and turning their eyeballs upward.

Professor Gregory was able to induce sleep in his own case by placing a small mirror over his head, so that looking at it strained his eyes upward.

A little practice will, I think, convince most people of the possibility of thus hypnotizing themselves.

But except for the purpose of getting sleep, mere auto-hypnotism is of little value, for we cannot make verbal suggestions to ourselves during hypnosis.

It would be an interesting subject of experiment to try if suggestions written out by ourselves, and used as the object of our fixed gaze for the purpose of self-hypnotization, would have any after-influence.

Spontaneous Hypnosis.—The distinction between this form of hypnosis and that we have just been considering, is that it is produced involuntarily, but also without the intervention of another.

Some persons who have been very frequently hypnotized develop an awkward propensity of passing into a condition of hypnosis without any apparent provocation at all, and are constantly going asleep. Such cases are, however, rare.

In another chapter it will be shown how this embarrassing propensity to spontaneous hypnosis can be guarded against.

A curious form of hypnosis which cannot be called spontaneous, but is certainly involuntary, is sometimes noticed among hystero-epileptics. If a loud noise, such as the sound of a Chinese gong or a peal of thunder is heard, or if a bright light should flash across their eyes, they instantly become cataleptic. One of Charcot's patients was thus detected in the act of stealing a photograph; just as she took it in her hand, a gong sounded, and she became cataleptic, and remained exactly in the attitude of dishonesty until found by a nurse.

One day when I was in La Charité, one of Dr. Luys' regular "transfer" subjects caught sight of my watch chain, on which the sun was shining, and immediately became hypnotized.

This form of involuntary hypnosis is very rare.

Suggestion without Hypnosis.—The effects produced by suggestion in the waking state are matters of every-day notice.

How depressing it is to most people to be told that they look ill; and if the remark is repeated by several acquaintances in succession, it will take a strong-minded person not to give way to suspicions that his health is really getting bad.

Many cases are on record where mere suggestions of this sort have led to very serious consequences, in some instances even fatal. The old story of the French criminal who was condemned to death, and killed by suggestion, is well known, but it is so much to the point that it will bear being once more referred to.

Some savants begged that a particular prisoner who was awaiting execution might be made the subject of experiment, to show how powerful the effect of the imagination might be.

They bandaged his eyes, then slightly scratched his arm, so slightly as not to cause any bleeding; a jet of warm water was now allowed to trickle down his arm and splash into a vessel. The experimenters talked to each other concerning the length of time a man would take to bleed to death, and every now and then exchanged remarks as to how pale the prisoner looked, how weak his pulse was becoming, etc. They had not to wait long to see how powerful an effect their suggestions could produce, for very soon the poor man's heart began to fail, and his execution, though absolutely bloodless, and a little more tedious, was just as complete as though the guillotine had been employed.

As a sort of converse to this, it may be mentioned that many of the Christian martyrs were so wholly possessed by their faith in Providence to protect them, that they bore, apparently without suffering, the preliminary tortures of the rack, and the final burning at the stake.

Professor Bernheim has published some very remarkable instances of patients who had been hypnotized being afterward, and without hypnosis, highly susceptible to suggestion, so much so that in some cases paralyses, contractures, anæsthesia, and hallucinations could be provoked.

A sharp discussion has taken place between Bernheim and Charles Richet as to which of them was the first to notice these phenomena.

In the second edition of his book, however, Bernheim acknowledges that Braid has made mention of them as early as 1846, in his treatise on "The Power of the Mind Over the Body," and contents himself with the claim to have been the first at least in pointing out the possibility of producing anæsthesia in the waking condition, which point Braid appears to have overlooked.

However, this claim to priority must be disputed, for Dr. Darling, who came from America to England in 1850, exhibited before Sir David Brewster and other scientists the phenomena of anæsthesia, produced by simple suggestion, in subjects who were so wide awake as to take an interest in the experiments of which they were the subjects;[18] he also showed the possibility of inducing motor paralyses, catalepsy, and hallucinations. (In this connection some experiments begun by Mr. Edward Gurney, but afterward repeated by other observ-

ers, including Dr. A. T. Myers, are intensely interesting, as showing that local anæsthesia and rigidity may in some cases be produced without hypnosis and without suggestion.

By a clever device the hands of a carefully blindfolded person were put through the apertures in a screen, so that it was quite impossible for him to see them. The fingers were then extended on a table, and the operator made gentle passes over one or two fingers only. In a minute or two it was found that these fingers were so profoundly insensible to pain that a lighted match applied to them was not felt, and that a powerful magneto-electric shock was unnoticed.

In some of the experiments passes were not employed, the operator simply pointing to the fingers he wished to affect.

Rigidity seemed to be as marked a feature as the anæsthesia.

The possibility of suggestion, or expectancy, appears to have been carefully eliminated, for the subject did not know the object of the experiments, and had no clew as to which of his fingers were being tried. Further, he was kept in animated conversation by one of those present.

For further details of these remarkable and so far inexplicable experiments, see the "Proceedings of the Psychical Research Society," 1883–85.)

Professor Simpson, whose name is so closely connected with the introduction, if not the actual discovery, of chloroform, was present at many of these experiments, and was led by them to investigate the subject himself.

He declared that he had by mere suggestion, without hypnosis, cured insomnia in some of his patients.

CHAPTER VII.

SOME OBJECTIONS TO HYPNOTISM.

It is very important that all who are willing or wishful to give hypnotism a trial should be acquainted with some of the objections which they may find urged against its use.

There are few subjects in connection with which prejudice is allowed such unbridled liberty, and it is surprising to find the number of people (alas! some of them medical men) who have never seen a patient hypnotized, and who are wholly ignorant of the literature of hypnotism, but are quite ready to express the most dogmatic opinions on the subject, and to condemn both it and its investigators without any reserve.

Satanic Origin.—At the end of the nineteenth century it seems hardly credible that a solitary individual could be found to believe that hypnotism is in some way a kind of black art; yet there are numbers of persons, and some of them even persons of fair education, who regard the agency as of Satanic origin. One woman, who was suffering intense pain from muscular rheumatism, and who was perfectly relieved after five minutes' hypnotic sleep, refused to see me the next time she was ill, as she "feared I had some connection with the Devil!"

It is strange that what seems a good thing should be ascribed to such a source; but it was ever so.

In no impious spirit, but reverently, I would remind my readers that when Christ healed the blind and dumb, the Pharisees declared, "This fellow doth not cast out devils, but by Beelzebub the prince of the devils."[19]

Galen, who is often called the "Father of Medicine," was accused of sorcery, and Paracelsus was held to have "tampered in the black art, and performed his cures by a compact with Satan."

Poor Burton, in 1632, declares that "the divell, without impediment, can penetrate through all parts of our bodies, and

cure such maladies by means to us unknown. Many famous cures are daily done in this kind, and the divill is an expert physitian; it is better to die than be so cured." [20]

In England, during the days of the Long Parliament, 3,000 persons were executed for "witchcraft," and it is truly pitiful to read on what evidence some of these unfortunate persons were condemned. Thus, one Helen Fraser was found guilty for "promising one Johne Ramsay, who was sick of a consuming disease, to do quhat in hir lay for the recoverie of his health." Janet Ross was tried for ordering a person, sick of a fever, "an egg with a little aqua-vita and pepper."

Isabel Malcolm's offence was "charming and curing a child's sore eye."

When the Jesuits, in 1649, introduced Peruvian bark into Europe, its use was prohibited on the ground that its cures were "too rapid," and that it possessed no virtue but what it derived from "a compact made by the Indians with the Devil."

When Lady Wortley Montague, in 1718, by her accounts of inoculation for small-pox in Turkey, caused its adoption in England, there were not wanting those who saw the Devil in this, as in everything else which was useful. Thus we find a Rev. Mr. Massey preaching, in 1722, in St. Andrew's Church, Holborn, that "all who infused the variolous ferment were hellish sorcerers, and that inoculation was the diabolical invention of Satan."

Jenner's introduction of vaccination was hailed with similar opposition, and from many pulpits came the announcement that "vaccination was Antichrist," that "God gave us small-pox, and that it was impious to interrupt it by the cowpock."

In 1844, when Elliotson and Braid were striving to get a trial for hypnotism, the Rev. Mr. McNeile, of Liverpool, preached that it was a "Satanic agency," and, like a bigot, went on to say: "I have seen nothing of it, nor do I think it right to tempt God by going to see it. I have not faith to go in the name of the Lord Jesus, and to command the Devil to depart."

Is it not strange that this man, who could tell the origin of a thing without seeing it, should have lacked faith to eject the Devil?

This great preacher may, for aught I know, be dead, but his spirit is still living.

I consider it hopeless to suggest any means of answering such opponents; they are so utterly unreasonable that it would be waste of time to argue the point with them. Better to leave them to the melancholy consolation of poor old Burton than try to convert them.

There is a curious similarity between Burton and one of the modern objectors to hypnotism, Dr. Norman Kerr, who thinks it a serious accusation against its use, that it may abolish pain, on the ground that, "by deadening the pain, we may be only silencing the unwelcome though merciful and necessary messenger, by which pain-killing, lulling us into false security, the disorder within may acquire increased lethal power."[21] There is one difference between the two writers, however. Dr. Kerr thinks "it is legitimate . . . to endeavor to obtain relief from pain when its severity or persistence, apart from the pathological origin of the suffering, is unbearable, or perilous to reason or life!" (He does not admit that it would be legitimate to relieve pain, even if it threatened life, by means of hypnotism.)

Injurious to Health and Morals.—Among the most frequently urged objections will be found the statement that the health and morals of the patients are undermined by hypnotism.

Sir Andrew Clark recently declared that "the habitual use of hypnotism on women is greatly injurious, both morally and intellectually," and for this "reason" condemns the employment of hypnotism *in toto*. Nothing could be more illogical.

If its injury is confined to women, why prohibit its use on men?

If Sir Andrew had pushed his "reasoning" a little further, he would have arrived at this conclusion: "The habitual use of alcohol, morphia, ether, bromides, chloral, cocaine, etc., etc., in either man or woman, is greatly injurious, not only morally and intellectually, but also physically and financially; therefore their use must be condemned *in toto!*"

Surely the learned baronet must have spoken hastily. Are we to refuse to employ wisely and occasionally any means of restoring health because its habitual use has injurious tendencies? No physician seeks to employ hypnotism on any patient habitually, and no physician confines his use of hypnotism to women.

It is only natural to find that Sir Andrew, when arriving at his conclusions, forgot his scientific instincts, and for the nonce put on the spirit of McNeile. He tells us that, in considering his verdict, he set aside a great deal of evidence which is given in books, and relied wholly on his own experience.

In common justice, I think this "experience" should be published, so that it may be weighed along with the "evidence which is given in books."

Dr. B. W. Richardson also condemns hypnotism, on the ground that its use would bring about "a transformation of mankind into a new and truly miserable mental condition."

This assertion has neither logic nor illustration to back it up; and were it not the pronouncement of an otherwise scientific observer, it would not be worthy of reproduction. The days of dogma are nearly over, and the mere dictum of any one, no matter how renowned, runs a serious chance of being challenged.

Dr. Norman Kerr, too, informs us that hypnotism is frequently followed by "disturbed nerve equilibrium," "upset nervous balance," "dissipated nerve energy," "intense languor and exhaustion, indicative of profound neurasthenia," which "neurasthenic collapse, frequently repeated, may lead to deterioration of brain and nerve function, a physical decadence, and a moral perversion."

Surely this is a crushing indictment. But even a prisoner charged with murder is innocent, in the eyes of the law, until the prosecution can make good its case. And so here we may claim that there is no necessity to rebut mere empty, though loud-sounding, words, since Dr. Kerr does not bring one jot or tittle of evidence to support his charges, nor a shred of argument to justify his passionate appeal to the profession to "set its face against the whole hypnotic process."

Seeing, then, that some of the leaders in our profession (it used to be difficult to induce the senior men of our profession to leave the old grooves. Thus we find that it was remarked that no physician in Europe who had reached forty years of age ever to the end of his life adopted Harvey's doctrine of the "circulation of the blood."—Hume's "History of England") will thus deliberately close their eyes to evidence, and refuse to investigate the fresh claims of hypnotism (which they thought had been stamped out forever with Elliotson

and Braid), it is not to be wondered at that large numbers of the laity regard it with a certain amount of superstition. Happily, this unwillingness to examine facts no longer exists among the great bulk of our foremost men, and it is encouraging to notice nowadays how our greatest teachers are eager to accept every new discovery which may be turned to account for the relief of humanity.

The very front rank of our profession has hastened to grasp the kernel of Pasteur's and Koch's work, and the same changed attitude is now observed toward hypnotism.

In November, 1842, a report was read to the Royal Medical and Chirurgical Society of London of an amputation of the thigh, painlessly performed during hypnosis, by Mr. W. Squire Ward, surgeon, of Wellow Hall.

This paper was received with the coarsest derision. One surgeon present said the paper should be supported by an affidavit, sworn before the Lord Mayor; another declared that the man had been "trained not to express pain."

At the next meeting, when the minutes came up for confirmation, Dr. Copland moved that all mention of Mr. Ward's case be erased from the minutes, because, among other things, "if the account of the man experiencing no agony during the operation were true, the fact was unworthy of their consideration, because pain is a wise provision of nature, and patients ought to suffer pain while their surgeon is operating: they are all the better for it, and recover better."

Among the others who were present, and acquiesced in this folly, were Sir Benjamin Brodie, Mr. Liston, Mr. Cæsar Hawkins, and Dr. Marshall Hall.

In 1890, the Psychological Section of the British Medical Association was crowded out by members from all the other departments, who were anxious to hear several papers bearing on hypnotism, and actually willing to witness the induction of hypnosis by Dr. Tuckey and myself in two patients, and, further, to take part in some experiments there and then. In the discussion which followed, such eminent men as Professor Gairdner, Drs. Hack Tuke, Clifford Allbutt, and Yellowlees took part, and they, with a unanimous meeting, declared that hypnotism is worthy of investigation, and forthwith nominated a committee of inquiry.

It is no part of my programme to try to anticipate the

report of this committee; but we may fairly even now look at some of the theoretic objections which have been offered to the use of hypnotism, and see if they correspond in any sense with the results of actual experience.

Personally, I have no hesitation in saying that, though I have induced hypnosis hundreds of times, I have never yet seen any injurious consequences, moral, intellectual, or physical, follow. On the contrary, I can conscientiously say that in nearly every case I have observed signs of improvement, even if only temporary. I do not mean to say that in every case I was successful in relieving the malady for which the aid of hypnotism was sought. Far from this. But in the least successful instances, where no modification of the ailment ensued, there were present a feeling of composure and comfort. In other instances, which were equally unsatisfactory, as far as the primary object of the hypnosis was concerned, there has followed a manifest improvement in the general health. In many cases there has followed hypnosis a complete cessation of the pain or other affection on account of which help was applied for.

As to the "intense langour," "neurasthenic collapse," "disturbed nerve equilibrium," "upset nerve balance," "dissipated nerve energy," "physical decadence," and "moral perversion," all I can say is that, though these terms seem very alarming, they are mere delusions, so far as my limited experience goes. If a medical man understands how to employ hypnotism as a therapeutic agency, I think it safe to predict he will never find any symptoms follow his treatment to warrant such a collection of threatening adjectives. I have not yet met with any such results, and prefer to "speak that I do know, and testify that I have seen," rather than accept the mere *ipse dixit* of any man who cannot claim to teach us from personal observation.

Concerning the moral aspect of this question, the chief danger is held to lie in the long-continued use of hypnotism. This is said to lead to degradation, etc., or, to express it in the vague words of Dr. Kerr, "one peculiarly grave occasional consequence of repeated hypnotic acts is that between the operator and the subject a subtle affinity, or *rapport*, may develop, which may involve both subject and operator. This obscure affinity of affectivity may, by a process of involuntary

non-hypnotic auto-suggestion, insensibly, yet gradually, grow upon the performer till he is in danger, though sorely against his will, and despite a strenuous struggle, of being unable to resist dangerous morbid impulses. In the person of both parties such an unhappy issue may coexist with fervid emotional religion."

This seems to me an unworthy and unmanly attempt to throw discredit upon hypnotic investigation, and also upon the characters of his professional brethren who are anxious to take part in it. It is the old and bitter accusation of over fifty years ago, when Elliotson's experiments were called "harlotry," and said to send patients forth transformed into prostitutes.

Let us have done with such cowardly attacks, and have the truth. What these modern objectors mean, but have not the courage to say, is that hypnotism begets a tendency to cast modesty aside, and violate the laws of chastity.

There is no proof of this, and it seems a cruel charge to make unless it can be supported by facts. By far the majority of our hypnotic patients are hypnotized very few times, and many of the most striking instances of relief have followed a single sitting.

In deep hypnosis, there may lurk moral danger, but such danger is not inherent in the hypnotism. Of this we will speak later. I have never come across a single patient who showed the slightest sign of moral deterioration or degradation; but I must say I have seen most remarkable moral improvement follow hypnotic treatment—the inebriate become sober, the untruthful veracious, the thief honest.

It is said that the intelligence is weakened. This I have not been able to verify. I have not even seen the faintest suspicion of mental confusion follow hypnosis, but I have seen the cloudy brain of the overworked clergyman or stock broker become clear and active again after hypnotism has been resorted to.

So far I have only been stating the result of my own experience. Let us now appeal to those who are better qualified to speak with authority.

Professor Bernheim [22] testifies that after a careful review of his work he believes that "hypnotic sleep in itself is beneficial, and is as free from harm as is natural sleep. In my

already long practice I have never seen any harm produced by sleep induced according to our method." (At this time, Professor Bernheim had induced hypnosis over 10,000 times.)

Professor Heidenhain,[23] of Breslau, gives it as his opinion that "hypnosis under the direction of medical men is harmless, but may do much good."

Professor von Krafft-Ebing,[24] of Graz, is led to a similar conclusion by his experimental studies.

Dr. Moll's[25] views are quite in accord with these opinions.

Drs. Van Renterghem and Van Eeden, of Amsterdam, and Dr. De Jong, of The Hague, all of whom conduct large hypnotic policlinics, assure me that they have no experience of any undesirable results following their treatment.

Dr. Auguste Voisin, of the Salpêtrière, who laid a report of some of his cases before the British Medical Association in 1889, told me the same thing.

Dr. Lloyd Tuckey,[26] of London, whose experience is considerable, believes that no ill effects will follow the judicious employment of hypnotism by medical men.

And lastly, but most important of all, we have the deliberate statement of the founder of the Nancy method, Dr. Liébeault, who, after thirty years' continuous practice of hypnotism, cannot recall a single occasion on which he regrets having adopted his modification of Braid's plan of treatment.

Hypnotism May Lead to Insanity.—This is a favorite objection to the introduction of hypnotic treatment, because from its gravity it is likely to produce a feeling of alarm in the minds of those who hear it.

As might be expected, Dr. Norman Kerr is one of the most emphatic on this point. He says the tendency of hypnotism is to "induce hysteric and allied morbid affections, to produce cerebral conditions conducive to mental unsoundness." Unlike himself, he endeavors to sustain this objection by evidence which will hardly be accepted as sound or sufficient. He tells us that during a long life, and thirty years' observation of hypnotism, in which he became "conversant with the leading mesmeric phenomena, past and present," he knew "at least one case" in which, "after apparent benefit from hypnotic treatment," mental instability passed into insanity! No reference is made to the interval between the hypnotic treatment and the development of insanity; no outline is given of the

family history, nor of the previous history, habits, circumstances, or surroundings of the patient. This man may have come of lunatic stock, may have been mad before, or been an inebriate, or met with some crushing reverse.

Surely where there was but a single case to trade on, these particulars might reasonably be expected. But no; they are of no importance. Suffice it to know that one man was hypnotized, and at some subsequent date lost his reason; therefore, his insanity was due to the hypnotism! And on such flimsy evidence as this, we are to be told that hypnotism tends to produce mental unsoundness.

Mr. M. J. Nolan submitted a paper entitled "Stuporose Insanity Consequent to Induced Hypnotism" to the British Medical Association at its 1890 meeting, the object of which was apparently to show the relation of cause and effect existing between hypnotism and some cases of insanity.

An account was given of a soldier who submitted himself to be hypnotized by an itinerant showwoman, and lapsed into a condition of stuporose insanity. Any importance that might have attached to this communication was completely neutralized by the previous history of the patient. I quote from Mr. Nolan's paper: "Two of his sisters were 'nervous.' . . . His habits became irregular, and he found he had not even the mental capacity to properly discharge the duties of his position (lance corporal). This sense of unfitness daily increased with his misconduct, until at length he was reduced. He now became unhappy, led an intemperate and licentious life, indulging in excesses as far as his opportunities and means permitted. In the October of 1888, when physically unstrung by dissipation of the grossest kind, and when at the same time he was in a state of extreme nervous tension, he attended an entertainment at which a lady undertook to perform some experiments in hypnotism."

It is quite clear from these statements that the man's mind was not particularly sound to start with, and equally clear that though the insanity was subsequent to the hypnosis, it is too great a strain on the facts to say it was consequent to it. (To the credit of Mr. Nolan it must be stated that in publishing this paper six months later, he altered its title to "Stuporose Insanity consecutive to Induced Hypnotism." January, 1891.)

The most conclusive answer, however, to this objection is

that, so far as I know, there has never yet been published a single case, foreign or English, where insanity has been shown, by evidence such as would be accepted by lawyers or logicians, to have followed as a result of hypnotic treatment administered by a medical man.

Until such a case is forthcoming, we need pay no further heed to alarmists. Dr. Julius Solow reported an experiment with hypnotism, which was followed by very awkward and alarming symptoms (New York Medical Journal, March 14th, 1891). A young man was hypnotized by a friend, at an evening party, for fun. The first attempt produced trembling throughout the whole body; a second trial was made with no better result; the third time, the subject was seized with violent trembling of the arms, and he began to shiver. He then fell on the floor, jumped up, became merry, laughed, joked, and sang; then violent convulsions set in, followed by aphasia; catalepsy next supervened, and the whole body, except the arms, became rigid. For two days, convulsions, aphasia, and catalepsy recurred very frequently, and the sight of anything bright excited the man to madness. Various sedatives were tried, and for ten days his condition was not much improved; but then the severe symptoms began to give way to outbursts of alternate singing and lamenting.

The victim then became feverish (temperature 103.5°) and perspired most profusely for a couple of days, after which he was nearly well. Eight days later, his temperature again rose, to 103°, and for three days more there was excessive sweating, with attacks of trembling and singing. He has since remained well.

In this instance the subject was a masturbator, and was at the time of the "experiment" in a highly nervous condition. The operator was an inexperienced amateur, and the object was an hour's amusement.

The Patient May Not Waken.—This is an objection which has taken firm hold of the public mind, but on what ground is it founded?

It has frequently happened to amateur hypnotists that, having succeeded past their expectations in producing hypnosis, they have come to the end of their knowledge, and their inability to waken their subjects has had very alarming consequences.

However, I am writing for medical men, not for amateurs, and I can say deliberately that I know of no such an accident having ever happened in the practice of a medical man who understood hypnotism. The process of dehypnotizing has already been described, but in all cases, even if the patient is left to himself, the hypnosis will end spontaneously and generally within an hour or two, leaving the sleeper feeling refreshed and quite well.

The public need therefore have no fear in submitting themselves to hypnotic treatment, on this score.

A gentleman who thought of asking me to hypnotize his wife recently, for neurasthenia of long standing, consulted his family doctor on the subject, and though this practitioner had admitted that his resources had been exhausted, he did not hesitate to forbid the trial of hypnotic treatment, on the ground that either the lady would never waken, or she would become insane!

Patient in the Power of Operator.—Another objection which is often urged against the use of hypnotism, and one which deters many people from subjecting themselves to hypnotic treatment is, that, if a person is once hypnotized, he will ever after be under the control of the hypnotist. This is carried to such an extent that some people imagine that the operator would be able to rehypnotize them, no matter what distance separated them, and that he would be able to influence all their thoughts and actions.

This absurd notion has no doubt had its origin in the untruthful boasts of the showmen mesmerists, who frequently, with a view to heightening the mystery which surrounds their performances, assert that they can affect their subjects from any place, just as easily as on the platform.

This objection, however, is utterly groundless, save and except so far as post-hypnotic impressions are concerned. Of course, if I suggest to a subject who is susceptible to such impressions, and is about to set out on a journey, say to Glasgow, "To-morrow at four o'clock you will fall asleep in your chair, and sleep for an hour," there is every probability that he will do so; but if I make no such suggestion, and the next day try, by concentrating my attention, to make the patient, who is now in Glasgow, go to sleep, it is equally certain that no such result will ensue.

In speaking thus broadly I make no reference to those curious cases which have been so extensively investigated by the Psychical Research Society, where a kind of "thought transference" takes place; such investigations, though undoubtedly of great interest, have as yet not touched nor been brought to bear on therapeutics. (Those who are interested in the subject of thought transference should consult the reports of this society, whose experiments have been conducted with wonderful patience, and in a most scientific spirit.)

Neither do I say that there are no cases on record where a hypnotist has seemed to be able to influence a particularly susceptible subject, even when separated by several streets.

What I do maintain, however, is that such cases are exceptional, and, like instances of spontaneous trance, or somnambulism, may be safely left out of our present calculations.

If a patient comes to me suffering from acute neuralgic pain, and I succeed in hypnotizing him, and his pain is relieved, the moment he crosses my threshold he is altogether beyond the reach of any personal influence of mine. More than this, if he only goes into an adjoining room, I can no longer affect him.

We will afterward see how the public may protect themselves against any danger of post-hypnotic influence.

Patient May Be Hypnotized Against Their Will.—A certain amount of prejudice has arisen against the introduction of hypnotism, from the pretty general impression that a person who can hypnotize is able to hypnotize any one against his or her will.

This objection is as easily disposed of as the others, for, except in those rare cases of acute hysteria, or hystero-epilepsy, and under other equally uncommon circumstances, I believe it to be wholly impossible to produce hypnosis without the consent and co-operation of the patient.[27]

The proportion of persons who can be hypnotized without their consent, by a sudden flash of light or an unexpected and loud noise, has been estimated by Charcot at one in every hundred thousand; so that the general public need not be much alarmed on this score. (When I first began to employ hypnotism in my regular practice, one gentleman was so fearful lest I should hypnotize him that if he saw me out walking

he would go up a side street to avoid meeting me, and if we happened to be in the same house he would immediately leave it.)

Hypnotism is of No Value.—Some of the opponents of hypnotism base their objection to it on the ground that it is of no use.

Thus we find Dr. Norman Kerr asserting that most of the alleged cures by means of hypnotism are delusions due to the "new-born amazed delight of medical enthusiasts in hypnotism," and comparing the effects of hypnotic relief to the "evanescent respite during a paroxysm of intoxication," and propounding the extraordinary doctrine that by easing pain we may "increase the lethal power of the patient's disorders."

Especially does this author single out supposed cures of inebriety as being wholly imaginary, and adds that it is his "observation," that such cases are "confirmed and intensified" by hypnotic treatment.

If Dr. Kerr has made any such observations, it is clearly his bounden duty, as one professing to be an expert in the treatment of inebriety, to publish the details of such observations; but as he has never done so, it would be just as open to those gentlemen who profess to have had good results from hypnotic treatment, to assert it as their opinion that Dr. Kerr's "observations" were purely imaginary.

Dr. Kerr refuses to accept any testimony on this particular subject of the cure of inebriety, except that of an "American or English specialist-expert."

But why should Continental physicians be wholly ignored? Is the evidence of such men as Professor Forel, of Zürich; Proessor Bernheim and Dr. Liébeault, of Nancy; and Dr. A. Voison, of Paris, to be regarded as untrustworthy?

And, again, why is it held essential that a physician should be a specialist-expert in order to know whether a drunkard has become a sober man or not?

By the term specialist-expert, Dr. Kerr explains that he means "a medical man who has devoted himself mainly to the scientific study and treatment of inebriety as a disease, and who has had large numbers of inebriates under his care."

If no others can offer an opinion on the cure of inebriety, the number of competent witnesses will be very limited. All our Gulls and Pagets, Clarks and Quains, Roberts and Broad-

bents, are unfit to declare whether a man is intemperate or sober.

Such an assumption is wholly preposterous, and it may fairly be claimed that the opinion of any observing physician of experience is just as much entitled to respect as that of even Dr. Norman Kerr himself. Inebriaty is, unfortunately, much too common an ailment for its observation to be monopolized by the "specialist-expert." It is, however, none of my business to undertake to prove that hypnotism is of therapeutic value, and that it affords permanent relief. My object in this little book is merely to induce medical men to try it, and decide for themselves whether it is useful or not, and I will only say here that it is the belief of hosts of medical men, who are by no means "enthusiasts," and whose "newborn amazed delight" has lasted for many years, that hypnotism is useful in a great number of cases, and that to me it seems that actual practical experience is worth far more than the theoretic observations of those who are disinclined to put the treatment to the test.

Hypnotism only Applicable at Special Seasons.—A curious objection is taken to hypnotism by Dr. B. W. Richardson, who declares that it will be "limited in application to short seasons of special social or meteorological cast."

As I am wholly unable to fathom the meaning of this statement, and have so far failed to meet with any astrologer or soothsayer who can interpret it, I am not in a position to do more than commend it to the consideration of my readers.

Hypnotism is Not a New Thing.—One particularly weak objection to hypnotism is that it is only a revival of an old thing.

This is one of the very best arguments in favor of its adoption; for if hypnotism has since ancient times been resorted to for the relief of disease, is it not likely that it has been found of some value?

The same objection might be urged against massage and hydropathy, both of which were in use among the ancients.

Only Applicable to Nervous Cases.—It is urged against hypnotism that it is only suitable for nervous cases; but if this were true, so far from being an argument against the use of hypnotism, it would be a strong ground for advocating it. Surely there is no class of ailment before which the physician

feels so powerless, and unfortunately the number of nervous cases is rapidly increasing.

Secrets May Be Revealed.—Some people dread hypnotism lest they should reveal secrets during their sleep. This fear is wholly groundless, for absolute silence is the rule in hypnosis, except when questions are asked. No honorable physician would put any question to his patient during hypnotic sleep that he would hesitate to ask if the subject was in his ordinary state. The presence of a witness gives further security.

This objection might more reasonably be raised against ether. I have more than once heard patients make most compromising statements while passing under the influence of ether.

CHAPTER VIII.

THE DANGERS AND SAFEGUARDS OF HYPNOTISM.

In the last chapter we considered many of the objections which are commonly urged against the use of hypnotism, and endeavored to prove that most of them arose from want of experience or proper knowledge of the subject.

It is now necessary for us to look at some of the real dangers attending the practice of hypnotism, and see if we are in a position to counteract them.

It will be convenient if we deal with these in relation to the patient, the public, the operator, and the science separately.

The dangers of the patient are due to the fact that some persons are so profoundly affected as to become absolutely passive in the hands of the operator. They are wholly insensible to pain, and to a certain extent unconscious of everything which may happen during hypnosis, in so far, at any rate, that on returning to their normal condition they are unable to remember a single incident that occurred during their sleep. Such persons may be called "lethargic."

Others become "actively somnambulic," and may be made to perform almost any act which is suggested by the operator, and of which they will have no recollection on awaking.

Still another class may fall into what is called a state of "lucid lethargy," during which, though they are wholly conscious, they are absolutely incapable of any movement, act of resistance, or speech.

Then, again, there are those patients who can be made to carry out certain suggestions post-hypnotically.

In the lethargic conditions, it is asserted that patients may be robbed or assaulted, whereas in the other states it is said that they may be induced to commit crimes, such as forgery, larceny, or even murder.

It must, however, be borne in mind that lethargy and

lucid lethargy are practically unknown outside the Salpêtrière and La Charité (Paris), and that the actively somnambulic and post-hypnotic classes are relatively small.

Of all the persons who are hypnotizable, only about fifteen per cent are somnambulists, and even among these one finds every degree of somnambulism; some will only perform simple acts suggested by the hypnotist, refusing absolutely to obey complicated or troublesome commands; others can be induced to carry out really difficult suggestions; but very few indeed can be persuaded to do anything which is either criminal, indecent, or inimical to their own interests.

Charcot denies absolutely that a single person can be led to perpetrate a crime by means of hypnotic suggestion.

Liégeois, on the other hand, asserts that it is a comparatively easy matter to induce patients to commit even murder.

Personally, I cannot give an opinion on this subject as far as crime is concerned, for I do not think it is justifiable for any individual observer to make experiments of this kind, though the point is of such vast importance that it should be investigated; but the committee appointed by the British Medical Association seems to be the right body to take the matter up.

However, assuming that in certain cases it is possible to commit a crime against a hypnotized person, or force such subject to carry out some unlawful suggestion, is there no protection open to the public? Fortunately, it is at hand, and so easy of application that there can be no excuse if it is not adopted.

No person should permit himself or herself to be hypnotized save by a medical man (or properly authorized scientist) who has a character to maintain, and in whose integrity and ability confidence can be reposed. And, further, no woman should allow herself to be hypnotized except in the presence of one or more witnesses of whom she approves.

If these precautions are observed by the public, they effectually do away with any risks as far as the subject is concerned.

Another possible danger which should be mentioned is not of a criminal nature; it is that in certain rare cases where a patient has been very frequently hypnotized, there may arise a tendency to hypnosis on slight provocation, or even spontaneously.

In medical practice as distinguished from purely experimental investigation, such cases are very unlikely to be met with, for the simple reason that very few patients require to be hypnotized more than a few times; but the systematic suggestion in every case that such tendency will not develop has been found to render its occurrence practically impossible.

The Dangers of the Public.—It is known to be possible, in a certain small percentage of subjects, to produce, by suggestion during hypnosis, post-hypnotic hallucinations, which we saw might be either passive or active. For example, A, a hypnotist, might suggest to B, a suitable subject, that C, an innocent third person, had stolen some article in B's presence. Now, assuming the suggestion to be successful, A might procure C's arrest, and at the trial B would swear that he witnessed the robbery; and, furthermore, he would believe his own evidence to be true.

So, a false charge backed up by false testimony, might be made the means of ruining a man's character, and be indulged in to gratify private malice.

Again, assuming that it is possible to cause a person to commit crimes post-hypnotically, we might have this case arising: A, the operator, might suggest to B, the subject, that at a certain hour the next day he will call on C and shoot him; and, in addition, that he will remember nothing of the suggestion having been given by A. For argument's sake, supposing such a case to arise, B will murder C, and, when put on his trial, will be wholly unable to account for his crime, and even deny, if examined on the point, that A had anything to do with it.

Such cases could very rarely happen, if at all, for, as Dr. Henry Maudsley points out, "a hypnotized person will not commonly do an indecent or criminal act; the command to do it is too great a shock to the sensibilities of the brain, and accordingly rouses its suspended functions."[28]

If either of these illustrative cases did occur, an expert in hypnotism would probably succeed in unravelling the mystery.

But the simple method of rendering such cases impossible is perfectly obvious: the practice of hypnotism should be made illegal, except in the hands of medical men or otherwise duly licensed persons. Such restriction seems urgently

called for, if for no other purpose than to remove the apprehension of the public.

The Dangers of the Operator.—From what has been said of the risks of the patient and the public, the dangers to which the hypnotist himself is exposed may readily be inferred; they may be summed up in two words, false charges.

It would be a very simple matter for some designing female to feign acute pain, and apply to a medical man who was known to practise hypnotism. If he was unwary, he might attempt to produce hypnosis, for the purpose of giving relief. What would be easier than for this woman to go away and accuse the doctor of having hypnotized her, and attempted to assault her?

Many other charges might be trumped up, the nature of which will suggest themselves to every medical man; and though the primary object of obtaining blackmail might fail, great anxiety, and very probably a certain amount of damage, would be sustained by the victim.

Here, again, there need be no difficulty in avoiding the danger: for if medical men will strictly adhere to the following rules, even the appearance of evil will be excluded:

Never hypnotize nor attempt to hypnotize a female, under any circumstances, except in the presence of at least one witness whose character is satisfactory to yourself.

It is essential that the witness should be known to be a respectable person; for if the patient bring her own witness, it is possible that such friend might be an accomplice.

In the case of young women and girls, I consider the mother is generally the most suitable person to be present; but, in the case of married women, I strongly advise practitioners to insist on the husband being the witness, wherever this is possible.

In dealing with men, the above rule may be relaxed if the patient is known to you, for then the presence of a witness may be dispensed with; but, in the case of strangers, it is safer never to hypnotize a man without having a third person present.

It has been held by some writers, who are ignorant of hypnotism, that no medical man should be permitted to hypnotize, save in the presence of one or more doctors.

Such a restriction would not only be unreasonable, but

would practically suppress all hypnotic treatment, except in the case of wealthy clients or hospital patients; for, in the great majority of families, it would be impossible to pay the fees of these medical witnesses, and it would be as manifestly unfair to expect the medical attendant to pay the witnesses as it would be to expect the latter to give their time gratuitously.

The suggestion also seems absurd; for, supposing a patient wishes to be treated by means of hypnotism, there is nothing for the second or third doctor to do but look on, and surely this function can be just as well performed by a layman.

Great capital has been made by some of the opponents of hypnotism out of the fact that the French government has recently forbidden the naval surgeons to practise hypnotism without permission; but this action on the part of the authorities is easily explained, and to be highly commended. It was found that many young medical officers, in order to relieve the tedium of life on board ship, were in the habit of hypnotizing the sailors for fun. This is what is now forbidden, and the most ardent advocate of hypnotic treatment will approve the prohibition of such pastime.

Hypnotism is much too serious a subject for any person to play with, and should only be undertaken soberly, and for the honest purpose of relieving pain or disease, or for the legitimate unravelling of some therapeutic, physiological, psychological, or medico-legal problem.

The Dangers to which Hypnotism Itself is Exposed.—When any new remedy or method of treatment is introduced, there is a great danger of its being swamped from many causes.

It has to struggle against prejudice, bigotry, and jealousy from without, and against its own shortcomings within.

We have read of the violent attacks which were made on vaccination, quinine, etc.

Lately we have witnessed the hard fight which antiseptic surgery has had to make for its adoption.

More recently we have seen the caution which was displayed with regard to Pasteur's inoculation for hydrophobia; and at this moment the brilliant discovery of Koch is suffering somewhat in prestige by reason of the reaction which has set in after the almost feverish excitement with which its announcement was received.

One of the greatest dangers which threatens any discovery is the over-zeal with which it is taken up by its early champions.

The history of therapeutics affords many instances where such over-zealous advocacy has delayed, if not altogether prevented, the adoption of useful remedies: not only is the over-sanguine prophet condemned, but even the good that is in his remedy is ignored. Thus, when it was claimed that massage was to be the unfailing remedy for all our ills, from fevers to fractures, lumbago to locomotor ataxy; or again, when electricity was heralded as the conqueror of disease in every form, which was to overcome ovarian tumor as easily as toothache, and, having triumphed over sickness, would even defy death itself, and summon back to life him who had already entered the valley of shadow—these undoubtedly valuable agencies ran the greatest risk of being altogether discredited, on account of the arrogant pretensions of their advocates; and even though they escaped this extreme fate, they have not yet wholly recovered from the results of the disappointments they occasioned, and are even now so little adopted in legitimate practice that charlatans are able to fatten on their dishonest gains, from the sale of their inert belts, coils, batteries, or trusses, or from their charges for "massage cures."

In the case of the present revival of hypnotism, it is sincerely to be hoped that the past history of mesmerism, animal magnetism, and braidism will afford sufficient warning to all who adopt this method of treatment to avoid everything which does not savor of cool, scientific, and temperate investigation.

Let all critical observers of hypnotism, and all who from their observations become its advocates, be absolutely honest, not only in the purpose of its employment, but also in reporting their results. We must not put it forward, as Mesmer did, as a cure-all, or we will certainly reap and deserve the condemnation of our brethren as soon as the actual weighing in the balance has found it wanting.

Neither must we allow the desire to see it adopted by medical men, or to induce patients to submit to its trial, exaggerate by one hair's breadth any results which may seem to follow its employment.

Failures are, and no doubt will continue to be, plenty in

hypnotic practice, and we must ever be ready to admit them; but, then, no treatment is invariably successful. Where, however, favorable results appear to follow hypnotic treatment, let us be careful to record the cases in their natural colors, without any deepening of shades or heightening of lights for the sake of effect. I believe firmly that a jury is always more impressed by a case which is, if anything, understated than by one which touches the margin so closely as to suggest the possibility of overlapping it.

Perhaps the greatest menace to which the legitimate use of hypnotism is exposed is the danger in which it stands of falling into the hands of unworthy people, who, owing to the present laxity of our law, are at liberty to prostitute its powers as a means of giving vulgar and often indecent or dangerous exhibitions to vulgar, ignorant, and maybe criminal audiences; to experiment, without restraint, as to how far its phenomena may be made subservient to the gratifying of base passions, the carrying out nefarious designs, or the escaping from the arm of justice.

It has been urged that to limit in any way the investigation or use of hypnotism is to interfere with the fundamental principle of legislation, which is held to be that "every one shall have freedom to investigate all the secrets and to exercise all the powers of nature and of mind, reserving to law the right, *ex post facto*, to punish the abuses of the liberty which it concedes."[29]

I have endeavored to answer this argument elsewhere,[30] and to show that this so-called fundamental rule is not respected in other departments. It seems to me that the public have a right to demand protection from any investigations of nature's secrets, and would be very foolish to console themselves with the *ex-post-facto* theory. Suppose, for instance, some person wishes to investigate the secret as to how much prussic acid will kill me; does it not seem absurd to say he should be at liberty to try, and that I need not care, but rest content that the law will, when I am dead, punish the investigator for abusing its liberty?

Personally I would prefer to depart from all the principles of legislation, fundamental or otherwise, than that any one should possess such dangerous license; but to me it seems a much more fundamental principle of sound legislation that

the weak and innocent should be protected, and known danger averted, and crimes prevented instead of punished.

I cannot doubt that very soon it will be deemed a reasonable request for the members of our profession to make, that they alone should by right be allowed to practise or investigate hypnotism.

Others there are, I know, who are not only well qualified to explore the region of this science, but who have for years been actively engaged in its study, while we unfortunately have held aloof from it. Some of these are scientists of the first order, and have already recorded stores of useful information, from which we may profit. (I do not intend here to refer by name to any of these observers, but I will say that I consider we are greatly indebted to some members of the Psychical Research Society for the work they have already done in relation to hypnotism.)

To all such I would gladly see granted an authority to continue to pursue their investigations; and to any other inquirers who might from time to time be anxious to delve into the depths of hypnotic research, and who could satisfy some examining body or official, not only of their integrity of purpose, but of their general qualification, I think a license to so investigate should be granted.

There is a physical as well as a moral reason why the practice of this science should be confided to medical men alone; and that is that, if in certain cases an intelligent diagnosis is not made, the result of hypnotic treatment may be disastrous. Thus, the case of a person suffering from gastric ulcer was once in Paris undertaken by a showman, who succeeded in producing hypnosis, but, not knowing the real cause of the illness, ordered the patient to go home, and eat a beefsteak. This suggestion was acted on, and the man died. This was really an instance of manslaughter, though due to ignorance.

Again, a man suffering from some valvular lesion of the heart might be set some task, such as running up steps or climbing a hill, which very probably would end in syncope.

Until the law takes cognizance of and suppresses the practice of hypnotism for the purpose of entertainment or treatment by non-medical men, is it asking too much of our profession when I urge on them to discountenance all public exhibitions of hypnotism?

Quite recently a large number of medical men in London, Manchester, and other places have been taken in by a most unscrupulous adventurer who advertised himself on hoardings and in the papers as "Dr.," and further described himself as a "pupil of Charcot." This impostor had no medical diploma whatever, but when challenged on the subject said he was a "doctor of hypnology," a degree which certainly is unknown in this country; yet this man, readily, I regret to say, induced medical men to preside at his performances, to act on his platform committees, and in some cases, I believe, actually to send patients to him. He even went the length of inviting the medical profession to attend a "clinic" which he opened in Manchester, and take lessons from him, in return for a handsome fee.

He openly boasted that he had many medical, clerical, and legal pupils. He undertook the cure of every disease on payment of a large honorarium in advance; at his public shows he excelled himself by giving the public lessons in the art of utilizing hypnotized subjects for criminal purposes. For a considerable period he demonstrated every evening how he could make one man, who was in his regular employ, steal or commit murder, and further how he, the real thief or murderer, could go scot free, owing to his subject not remembering what had occurred during hypnosis.

And yet this professor of crime, patronized by medical men, undisturbed by the police, continued to flourish, as a living sample of how the "fundamental principle of legislation" works.

Surely it is our bounden duty, whether we ourselves finally adopt hypnotism or not, to use the weight which is attached to a unanimous professional opinion, in creating a wholesome feeling of disgust toward such degrading exhibitions, so that it may soon be considered somewhat of a disgrace to have to admit having been present at one.

CHAPTER IX.

THE MEDICO-LEGAL ASPECT OF HYPNOTISM.

The bearing of hypnotism on medical jurisprudence has as yet been very imperfectly studied, and there is no part of the subject on which there is so much want of unanimity, even among hypnotists.

There are very grave difficulties to be encountered in the investigation of hypnotism from the legal standpoint; but the importance of the problems involved renders the attempt of their solution imperative.

The great question to be determined is, How far can hypnotism be employed as a criminal agency? And this question was brought into striking prominence in a recent criminal trial in Paris, which will be historically known as the "Gouffé murder trial," the defence having been set up on behalf of one of the prisoners, Gabrielle Bompard, that she took part in the murder of Gouffé, under the compulsion of the post-hypnotic suggestions of her paramour, Michel Eyraud. Evidence was called on one side to show that such a defence was based upon the fact that it was perfectly easy to compel a subject to carry out any criminal suggestion, and on the other side testimony was forthcoming to show that it was wholly impossible to procure the commission of crime by any amount of hypnotic suggestion. The jury refused to accept the defence, and the female prisoner was sentenced to twenty years' imprisonment, while Eyraud was condemned to death.

Fortunately hypnotism has not yet been invoked, either as an accusation or defence in our English courts, though quite recently it was very nearly summoned to the help of a young woman who shot her former master. One of the London daily papers, while the trial was pending, actually went out of its way to suggest that possibly this woman had acted under the hypnotic guidance of her husband, who was known to entertain a grudge against the murdered man. The hypo-

thesis of the newspaper was not, however, grasped by the prisoner's counsel.

At any moment I should not be surprised, however, if hypnotism were the subject of inquiry before a judge and jury; and so it is necessary that we should at least know something of the points which would be raised.

Can a hypnotized subject be assaulted? is one of the very first questions that suggests itself.

Luys[31] declares that "in the lethargic and cataleptic stages the subject is exposed to any attack and any outrage; he may be made to swallow poison, inhale noxious gases, or rendered completely intoxicated. Indecent assaults and violations may take place; even pregnancy has been produced without the patient having any recollection of its cause. Such cases are not very uncommon, and many women have been ruined under the influence of hypnotism." This is a terrible indictment; but I cannot help thinking that the picture is considerably overdrawn, at least in so far as it deals with the frequency of the criminal employment of hypnotism. But it cannot be denied that hypnotism has sometimes been put to base uses; but such cases, though they never seem to have been very frequent, were certainly of more common occurrence during the days of the so-called "animal magnetism" than in recent times.

A case was reported in 1821 where the magnetizer, unfortunately a medical man, assaulted a patient. In 1853 a professional magnetizer in Marseilles, not a doctor, took advantage of a girl during hypnotism. In 1865 an assault committed by a beggar named Castellan on a young woman in the village of Guiols caused a great stir. The victim was evidently in the state known as "lucid lethargy," for, though she retained her consciousness to the full, she was absolutely unable to resist or cry for help.

In 1879 a dentist in Rouen was sentenced to ten years' imprisonment for assaulting a client during the hypnotic sleep.

Professor Liégeois, of Nancy, has devoted a great deal of attention to this subject, and those who wish to pursue it further should read his book.[32]

Sufficient, however, has been stated to show how important are the rules laid down, not only for the protection of the public, but for the protection of the operator's reputation.

That such cases have occurred must not for one moment be allowed to weigh against the legitimate practice of hypnotism by proper persons, for chloroform has been used for murder and violation, so have ether and nitrous oxide; and one well authenticated case is on record, of rape having been committed during natural sleep. Hosts of our every-day remedies have from time to time been used for criminal purposes: morphia, opium, arsenic, chloral, cantharides, etc.; but because a remedial agent may be abused is no reason why its use should be abandoned. It is only an argument in favor of proper restrictions and safeguards. It must also not be lost sight of that the proportion of hypnotizable persons on whom such assaults would be at all possible is very small indeed.

Can a subject be induced to commit crime during or after hypnosis? Moll [33] believes that suicide could be caused by hypnotic suggestion, and also that it is possible to obtain deeds of gift, checks, or promissory notes during hypnosis, and that wills could be influenced in this way.

Liégeois has induced some of his subjects to commit almost every crime during hypnosis, such as shooting one's mother with a revolver (unloaded), stabbing with a knife (a paper-cutter), poisoning a friend's drink with arsenic (soda).

In all these experiments, one fact must be clearly borne in mind. The subjects knew very well who was the experimenter, and had the utmost confidence in his uprightness; it seems also highly probable that they knew very well that the revolver had no bullet, the arsenic no deadly property, and the knife no cutting edge.

Another point which should also be given due weight in the consideration of this part of the subject is that a great many of the French experiments have been conducted under circumstances wholly foreign to ordinary medical practice. For instance, many of the subjects of experiment in Luys' laboratory are what might be termed professional subjects; that is, they make their living by submitting day after day to the repetition of experiments, and take a sort of morbid pride in accomplishing whatever is expected of them. Experiments conducted under such conditions can hardly be considered to furnish reliable data for arriving at general conclusions. What we want to determine is this: Can an ordinary person

who submits to hypnotic treatment be induced by suggestion to commit a real crime either during or after hypnotism?

My own limited experience on this point leads me to suppose that the possibility of producing such effects has been greatly exaggerated. Of course I have never tried the actual experiment of suggesting to a patient that he should commit theft or murder, but I have frequently made simple experiments, which are not without some bearing on the question. For instance, one of my patients who becomes profoundly somnambulic, and to whom I can successfully suggest the most absurd changes of personality, so that he fancies himself to be, and acts the part of a girl, a soldier, a public singer, or a doctor, will sing or play the piano, but no amount of persuasion will induce him to make speech. Now this is the one thing that he will not do in his ordinary state, and it is instructive to see how he clings to his aversion in hypnosis.

Another of my patients, a lad of about sixteen, has for years taken a boyish pride in the fact that he will not kiss any one of the opposite sex, not even his mother. I have frequently hypnotized this youth, and can induce almost any hallucination by the merest suggestion. He will play with imaginary marbles, and equally visionary companions, but if it is suggested to him to kiss his sister, not only is the suggestion rejected, but he instantly awakes.

These are trifling experiments, but they tend at least to show that where any principle is firmly rooted in a man's nature, he will not easily be induced to break through it, and I believe that further experiments will show that, in general, hypnotism will be powerless to induce an honest man to steal, or a virtuous man to commit murder.

"Locking" of Patients.—A curious phenomenon of hypnotism, which requires very careful investigation, in connection with medical jurisprudence, is what is called the "locking of patients."

What is meant by the term is this: If a hypnotist suggests to his patient during hypnosis that no other person will be able to hypnotize him it will generally be found that the suggestion has rendered the patient proof against the influence of other operators. An amusing instance of this is related of M. Bernheim and M. Liébeault. The latter hypnotized a patient who was under Bernheim's care, and suggested

that the next time he should visit Bernheim, that gentleman would be unable to affect him. The man went as usual on the appointed day, and the professor was much chagrined to find that he could make no impression on the patient who had previously been easily hypnotized. The patient could offer no explanation, for he had no recollection of Liébault's suggestion.

It is a common practice among medical hypnotists, and one which I invariably adopt, to suggest to my patients, "No person will be able to hypnotize you except at your own request." But the question arises, Is it possible for a criminal hypnotist to absolutely prevent a person being hypnotized by any person but himself? The importance of this question is due to the fact that most persons who forget on wakening what has occurred during hypnosis, recall every detail if again hypnotized. So, suppose for the sake of argument, that a person is impelled to commit a crime, he may not on wakening be able to tell who suggested it, or indeed that it was in any way due to suggestion; but if the same person should be again hypnotized, he would be able to give the necessary information, and so lead to the punishment of the real offender.

The consideration of this point leads to another legal difficulty. Is it permissible to elicit evidence during hypnosis? In other words, would it be justifiable to hypnotize a person, if possible, in order to revive the memory of a past hypnosis, and so establish what has aptly been termed "memory bridge?"

By some it has been held that evidence so obtained would not be admissible in a court.

Every one is agreed, I think, in England at least, that it is not right to administer ether to a prisoner or witness, for the purpose of forcing a confession, but the case seems altogether different if a person willingly submits to being hypnotized, or requests that he should be hypnotized, for the express purpose of aiding his memory, as to some incident in a previous hypnosis. I should think evidence obtained in this way was quite admissible, but even if this is granted, such testimony should be strongly supported by corroborative evidence, for it would be possible for a clever criminal to develop a convenient memory for the purpose of fastening his own offence on another person. It would have to be proved at least that the witness

was in the company of the supposed hypnotist at the time stated; and further, that there existed some strong motive why the latter should have suggested the crime, etc. However, this seems purely a question for the lawyers to decide, and I will not pursue it further.

False Evidence.—It has been shown that in certain cases it is possible to develop false memories in hypnosis, which may last post-hypnotically. Thus it may be impressed on a subject that he was a witness of a shocking murder, and this impression may take such hold of the person that he will swear to all the details of the crime.

This point may, under certain circumstances, have to be remembered.

Lying During Hypnosis.—It is entirely erroneous to suppose, as many do, that during hypnosis people will invariably tell the truth, even if their statements should prejudice themselves. I have heard a subject, on whom I was experimenting, tell a deliberate falsehood, and back it up with a tissue of perfectly logical though untruthful statements, and yet on being awakened, he had no idea of what he had been asked or answered, or indeed that he had been spoken to or spoken at all.

Hypnotism Invoked as an Aid to Crime by the Criminal Himself.—It has been suggested that a person who wished to commit a crime might get a confederate to hypnotize him, and suggest the carrying out of the object.

The idea seems somewhat far-fetched, yet it is not devoid of interest. We know that a murderer's courage often fails him, and he has to get a supply of the "Dutch" material.

When the historical Phœnix Park murder was planned and the perpetrators selected by lot, the men admitted that they could not bring themselves to stab a man they knew to be perfectly inoffensive, so they resorted to drink for the purpose of getting "enough of the Devil in them" to carry out their fiendish orders.

It may be possible then that men criminally disposed might resort to hypnotism, so as the more coolly to carry out their intentions, in the hope that, unlike alcohol, it would leave their brains clear, and their muscles quick.

Such are a few of the problems which have to be faced and the sooner our ignorance about them is cleared away the better.

Some people seem to think it is wrong to consider such questions at all, and that their investigation is dangerous, but surely scientists should not fear the truth. It seems a greater danger, if such criminal possibilities reside in hypnotism, for us not to be aware of them. If the investigation proves they do not exist, it will at least ease our minds; but if it should show that it is possible to so abuse hypnotism as to render it a power for evil, we may rest assured it will also bring to light the means whereby the danger can be averted.

CHAPTER X.

DR. LUYS' "TRANSFER" EXPERIMENTS.

THOUGH the subject of "transfer" experiments has only a very remote connection with the Nancy method of treatment, one can hardly afford to pass by the recent reports from the charity hospital in Paris without notice.

A short time since, English readers were startled by the articles from the pen of Dr. Luys, entitled "The Recent Discoveries in Hypnotism";[34] the essence of these "discoveries" being the statement that various diseases can be transferred from a sick person awake to a healthy hypnotized subject by means of a magnet, and that when the hypnosis is ended the subject is at once freed from all traces of the "transferred" ailment.

The idea of transference, which is supposed to be a recent discovery, is by no means new; for we find Professor Gregory declaring, forty years ago,[35] that painful and chronic affections were transferred from the subject to the mesmerist who operated upon them. He also quotes a Mr. Atkinson, who declared that when he mesmerized patients he often found that their pains were temporarily transferred to himself.

Neither is there anything novel in the theory that magnets have some powerful influence on the body. Baron von Reichenbach published in 1845 an account of his researches on the action of magnets upon human beings (*Wer ist sensitiv, wer nicht*). He found that in some persons, called "sensitives," the presence of a magnet produced unconsciousness or hypnosis; in others catalepsy or even convulsions, according to their varying susceptibility: but though such extreme results were rare, it was held that one person in every three was "sensitive" in some degree. The influence of the magnet was termed by Reichenbach "odyle" or "od force," and was declared to be polar; that is, each end of the magnet produced different impressions; the negative or north pole causing a

delightful coolness, and giving out a blue "od light," while the positive or south pole produced a disagreeable warmth, and emitted a red "od light."

Magnets, crystals, etc., have long been considered capable of removing pains, such as headache, neuralgia, and rheumatic suffering.

Charcot made a series of experiments with magnets in hysterical cases and professed to be able to transfer contractures from one side of the body to the other.

Binet and Féré confirm Charcot's experiments, and also point out that in cases of symmetrical contractures the magnet produced jerkings, convulsions, and disappearance of the contractures.[36] These observers also tell us that cataleptic attitudes can be transferred from one side of the body to the other.

But to return to Luys. He says, "this new method of therapeutics consists in the transference of the nervous state of a diseased subject to a subject hypnotized by means of a magnetic rod." The process is thus described (A being the patient, who is wide awake; B, the subject, in a state of lethargy):

"A lays his hands on those of the sleeping subject, and an assistant, holding a big magnetized rod with three branches, moves it for a minute or two in front of the arms of the two persons placed before him. He follows the lines of the limbs, forming thus a circuit of continuous magnetization, and at the same time he takes good care only to work with the north pole (this is of vital importance) when he stops at the painful places pointed out by the patient."

In a short time the affection of the patient is supposed to be transferred to the subject, who also assumes the personality of the patient whose ailment has been received. The subject is then aroused, and instantly the assumed disease and personality disappear. As to the result, let Dr. Luys again tell his own tale: "The sole result is the relief of the patient, whose condition is sometimes modified at once, or as a general rule after the expiration of two or three hours."

As previously stated, this is not an argumentative book, and so I do not propose to combat Dr. Luys' assertion here; but I think for the guidance of others, and to prevent disappointment, it may be well to state some impressions gathered during a visit to Dr. Luys' laboratory.

Before doing so, it is my pleasing duty to place on record my sincere thanks to Dr. Luys and his able *chef de la clinique*, M. Gérard Encausse, for their most cordial reception and for the painstaking, courteous, and frank way in which they facilitated my observations. I also wish to state distinctly that the strongest impression which was left on my mind after repeated visits to La Charité was that Dr. Luys was absolutely honest (even if mistaken) in his statements, and thoroughly believed in the genuineness and precision of his experiments. Having said so much, let us proceed to the laboratory, and recall a few of the points which were observed there.

The subjects all seemed to belong to the hysterical class.

The same set of subjects attend the laboratory daily.

They are paid by the patients whose ailments they are supposed to take, the gratuities being the sole object of their attendance (though they may have been patients of the hospital originally).

There are generally three or four of them present as spectators of every transfer experiment (also at the experiments with sealed tubes—see after), and so they can easily see what is expected of them when their turn comes.

The subjects regularly read the clinical reports of the hospital.

The ailment is seen to be adopted by the subject when it is an apparent one such as paralysis; it is assumed to be transferred if it is not a visible complaint, such as cardialgia.

The patient in many cases does not appear to the observer to be any better when the transfer is said to have been effected. Thus, I noticed a patient suffering from paralysis agitans, whose affection I saw on three occasions "transferred" to a subject; at each sitting the subject certainly adopted a most violent palsy, but the real sufferer did not seem to benefit in the slightest degree.

On the other hand, it is only fair to state that a very intelligent patient informed me that he had been greatly relieved of palpitation, dyspnœa, and swollen ankles by means of transfer.

The north pole was held to be essential, but in at least one case I noticed that the south pole was employed with seemingly similar effect.

The method of diagnosis which is often adopted in the case of patients whose ailment is not self-evident seemed altogether unique. All physical examination is omitted, the patient not even being questioned as to his or her symptoms; auscultation and percussion are discarded, family and personal history ignored, the pulse is not felt, nor even the tongue inspected. When the magnet has been passed to and fro for a sufficient length of time to allow of the transfer taking place, the slumbering subject is rendered somnambulic by quickly opening the eyes, and then questioned as to the diagnosis of her assumed ailment. She pronounces it to be eczema, headache, neuralgia, or rheumatism as the case may be, and her verdict is accepted without verification in any way. In some instances no diagnosis, even of this questionable kind, seemed to be made. During one of my visits a strong-looking woman came to the laboratory and said she wished for transfer. She was immediately placed opposite one of the subjects, and M. Encausse began to apply the magnet. Seeing that no examination was made, I thought she must be an old patient, and asked the *chef de la clinique* what was her complaint. He astonished me by saying: "I do not know; it is her first visit; but when the transfer has been accomplished the subject will tell us." When the process was over, the subject described an irritation of the skin of the left side of the body, and the patient said this was correct.

This looks like what is called "clairvoyance," but clairvoyants claim to be able to see what is wrong with a person without either magnet or transfer.

Now, the weak points in all these experiments appear to be the following:

The subjects are all practically professional transferees, who know that their services would very soon be dispensed with if they failed to appear to take over the affections of their patrons.

These transferees are in a constant state of training, for when not actually employed they are the interested and observing spectators of the performances in which their colleagues are playing principal parts. They listen attentively to all the comments of the doctors, patients, and visitors, and thus learn precisely what is looked for in any given case. They converse freely with the patients who are in waiting for

treatment, and they study carefully, in the "Review of Hypnology," the reports of their own accomplishments.

I should have liked very much, but for the discourtesy of the thing, to have substituted without the knowledge of any of the actors, a plain bar of lead or iron for the magnetized rods, and further to have tried if the subject (whose eyes are always closed) would have assumed the patient's troubles if led to suppose by affirmation that the magnet was being used when nothing was really employed.

The method of diagnosis strikes one as very unscientific.

The part which may be employed by suggestion in the waking state in the case of a patient and in the hypnotic condition of the subject, seems to be entirely overlooked.

The experiments of Professor Bernheim throw a very strong light on those of Dr. Luys.

Bernheim hypnotized a patient in the presence of M. Beaunis, and induced a cataleptic condition of the left arm; he then applied a magnet to the right hand for eight minutes, but no transference or other phenomena were observed. Now turning aside to M. Beaunis, Bernheim remarked: "I am going to try an experiment. When I apply this magnet to the right hand, you will see in a moment the right arm will assume the exact position of the left, which will then relax and fall." The same magnet was then placed exactly as it had been before, and in a minute the suggested transfer was complete, without the slightest betrayal of consciousness on the patient's face. Next, Bernheim produced contracture of the muscles of the left side of the neck, and without speaking applied the magnet to the right side. In a moment an exact transfer occurred. On every subsequent trial similar transfers took place in any position, without any further suggestion. Here, then, we see the effect of one simple sentence addressed to a third person in the hearing of the subject. Does it not strike one at once that the subjects of Dr. Luys' laboratory—who, as it were, breathe an atmosphere of suggestion, who hear daily conversations about and explanations of the phenomena of transfer, who read the literature of the subject and are permitted to witness the experiments—may, like Bernheim's subjects, be more affected by the suggestions (unconsciously given by the operator) than by the magnet?

But Bernheim pushed his experiments further. He said to

one of his colleagues, in the hearing of a hypnotized subject in whom he had been inducing the usual "magnetic transfers," "Now I will change the direction of the magnet, and you will notice that the transfer will take place from the arm to the leg." At the end of the minute the cataleptic arm fell, and the leg was raised and became rigid. The magnet was then replaced by a penknife, a bottle, or a roll of paper, and in every instance the transfer occurred just as when the real magnet was employed. The next day Bernheim repeated all these experiments in the case of another patient, who had been present the day before; and without saying anything to her or in her hearing, they all succeeded just as well as in the other case. Here, though no direct verbal ideas were given to the patient, the suggestion of the transfer had been impressed on the mind by what had been seen to occur in the case of another subject.

Dr. Luys showed me a special magnet which he had devised for encircling the cranium, and with which he was experimenting. At a recent meeting of the Paris Biological Society, he reported the results of his researches.[37] The magnet is placed on the head of a neurotic patient for five minutes, and then removed and put on the head of a hypnotized subject, to whom the patient's neurosis is at once transferred. The following case was cited. A patient who was suffering from right hemiplegia and difficulty of speech was placed in a horizontal position, and the magnet fixed so as to encircle his head. At the end of five minutes, without a word having been spoken, the magnet was removed and placed on the head of a subject in the next room, who had been previously hypnotized. Almost immediately the subject became paralyzed on the right side, and embarrassed in speech. On being aroused, the subject's motion and speech were restored, but the patient's condition remained unaltered. It was further noticed that if the same magnet was placed on the head of a third patient, it still provoked the same symptoms, though in a less degree.

Now, though nothing was spoken in the hearing of the subject during this experiment, and though she was at the time in an adjoining room, it is by no means clear that she was not cognizant of similar experiments which had been carried on for weeks; and judging from what I saw of the liberty given

to the regular subjects, I should think it most probable that this particular one had been permitted to see other experiments with this cranial magnet and to hear the conferences concerning them.

Bernheim's work shows that, in order that such "experiments" may have any sufficient value, much greater precautions than are now exercised at La Charité, to eliminate the possible element of indirect suggestion, would have to be adopted.

Babinski, one of Charcot's pupils, placed sick people who were awake, and hypnotized subjects, back to back, with a magnet between them. He found that the transfer took place in a manner similar to that noted by Luys.

M. Auguste Voisin, of the Salpêtrière; Forel, of Zürich, as well as Bernheim and others, have not been able to obtain the same results as Luys when suggestion was strictly excluded; and a commission of the French Academy of Medicine, having repeated Luys' experiments in his own presence, reported adversely on them.

Dr. Tuckey and I obtained exact duplicates of Luys' magnetic bars from the Paris maker who supplied the originals, but so far neither of us has been able to elicit any but negative results from their application.

Luys' Emotional Experiments.—Some very striking emotional effects are held to be produced by the magnet, and are cleverly described in one of the articles already referred to ("Fortnightly Review," August, 1890).

It is held that as the north pole of a magnet attracts the needle, while the south repels it, so in human beings corresponding emotions are excited. Thus, to quote Dr. Luys: "If you present the north pole of a magnetic rod to a subject in a state of lethargy, you arouse in him movements of joy and expansion of feeling; and if you connect him with the south pole, movements of repulsion appear."

By Dr. Luys' kind permission I am enabled to reproduce on the next pages two of his photographs showing these effects—

Fig. 2, photograph showing the effect of the north pole.

Fig. 3, photograph showing the effect of the south pole.

Dr. Luys very kindly repeated these experiments for me, and the exact appearances depicted above were reproduced. But I must say that the subject in whom they were demon-

FIG. 2.—PHOTOGRAPH SHOWING THE EFFECT OF THE NORTH POLE.

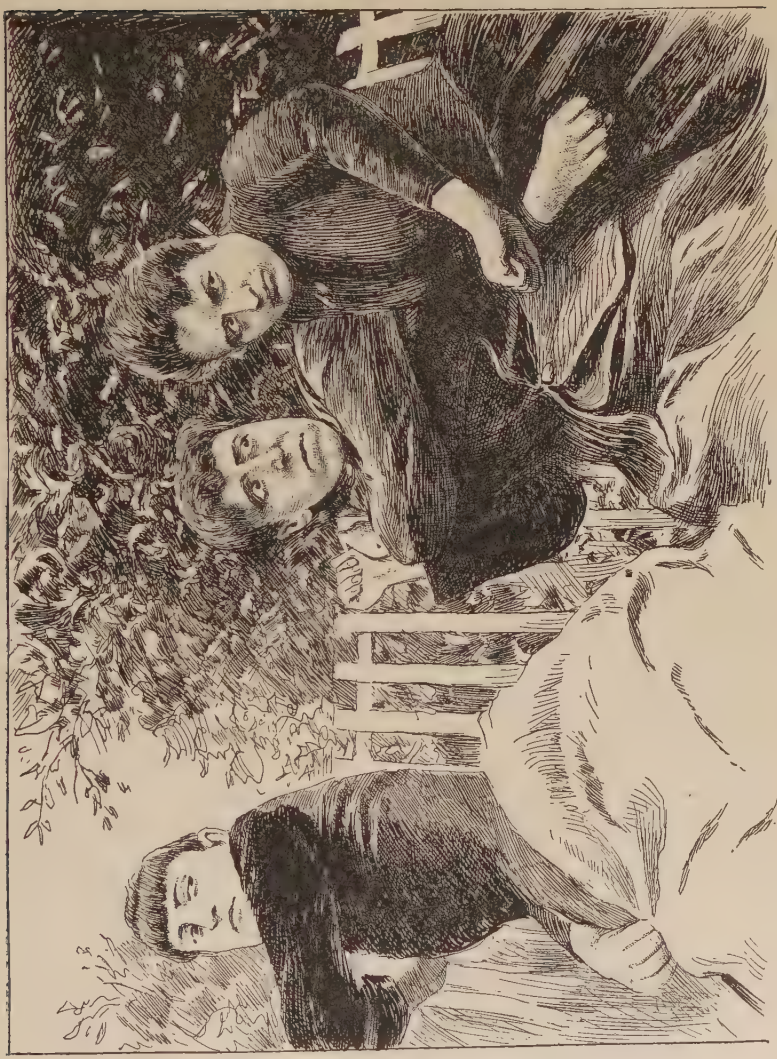
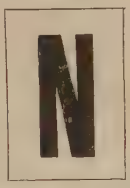


FIG. 3.—PHOTOGRAPH SHOWING THE EFFECT OF THE SOUTH POLE.

strated was one of those in the photograph, and so was perfectly familiar with the experiment; further, that any of the subjects can study these, and many other photographs illustrating all the magnetic experiments, on the walls of the laboratory; and further, that on every magnet used for these emotional experiments the north pole is clearly indicated (no doubt for the guidance of the operator) by a postage stamp marked in blue ink with a large N, so:



The subjects are also said to see a beautiful yellow light issuing from the north pole, and a blue light from the south pole. On this point it is instructive to notice that Reichenbach's "sensitives" observed that the "odylic light" was of a beautiful blue color at the north pole and a disagreeable yellow at the south; so, though Luys appeals to those earlier researches for confirmation of his own, there is at least this discrepancy between them. (In conection with all the experiments above referred to, whether of Charcot, Binet and Féré, or Luys, it may be said that the most reliable test of any magnetic influence seems to be that employed by the "Reichenbach" committee of the Physical Research Society, who undertook to test the supposed luminosity of magnets in the case of sensitives. The method adopted was very ingenious. A large electromagnet was employed and placed in an absolutely dark room, where the subjects were seated with several members of the committee. In another room were the Smee cells which excited the magnet, and the commutator which made or broke the current was here under the control of other members of the committee. No times for making contact were arranged beforehand, so that it was impossible for the subjects to know when the apparatus was really a magnet and when not.

This arrangement seems the most satisfactory way of making magnetic experiments.

The report of the committee is most interesting, and will be found in the society's proceedings.)

Luys also produces these emotional effects with colored glass balls, the subjects becoming wild with delight at the sight of a yellow ball, but almost violently annoyed if a blue one was substituted. While I am not in a position to deny that some persons may see flames at the poles of a magnet, I

will say that in many subjects it is very easy to produce hallucinatory flames of any hue by suggestion, and some of my patients have declared spontaneously that they saw a faint blue light issuing from my hand, when no notion of such a thing was present in my mind.

Effect of Drugs in Sealed Tubes.—Another set of experiments described by Dr. Luys in this paper may be conveniently referred to here. He says: "In order to produce these effects, we may practise with any substances in small quantities in solution, used in tubes of glass closed and corked. These tubes may be laid on the skin on the front part of the neck, either on the right or left side, in front of the ear, eye, nose, or lips, and the appropriate reactions are immediately brought about. To start with, the patient should be thrown into the lethargic state, care being taken not to utter a word."

I asked Dr. Luys to make one of these experiments in my presence, and with his unfailing courtesy he at once consented. The subject selected was one of the regular *habitués* of the laboratory. As soon as the lethargy was induced, a tube containing brandy was slipped in at the neck of the girl's dress, and Dr. Luys, who stood at one side of the subject, while I was at the other, remarked to me in a loud whisper, "*Eau de vie.*" In a few seconds the subject remarked that she felt drunk, began singing excitedly, and finally left her seat, staggered, and fell on the floor. Here any conclusions which might be drawn from the test were absolutely nullified by the operator's breach of his own rule, "not to utter a word."

Krafft-Ebing has conducted similar experiments with pilocarpine, atropine, apomorphine, and alcohol, but is unable to confirm Luys.

Experiments with medicines in closed tubes were, I believe, first made by Grocco, an Italian physician.

In thus criticising Luys' experiments with magnets, colors, and medicines in tubes, I do not for a moment wish to dogmatize, for though I have not been able to obtain the results claimed, this is no reason that other observers should not. I have not had the necessary time to conduct a sufficiently large number of experiments; but, before I am prepared to accept such striking results as genuinely due to the causes to which they are attributed, they must pass through a much

more fiery ordeal than the process of experiment which obtains at La Charité.

Concerning the curative results claimed for some of the transfer operations, it seems to me possible that they, too, might be explained as due to suggestion; for though the patients are not hypnotized (only the transferees), we must not neglect the evidence of those who have observed the effects of suggestion in the wakeful condition. Gregory recorded forty years ago that catalepsy, paralysis, anæsthesia, analgesia, and hallucinations could be produced in certain susceptible patients in their normal state. Braid, too, noted some of these phenomena, and Bernheim has since confirmed these observations.

Now the question arises, Are people in whom such phenomena can be produced, though seemingly in their natural condition, really hypnotized or not? They are certainly not hypnotized in the ordinary sense; but if we remember the definition which we adopted at the outset of "hypnosis," as a state of "heightened receptivity of suggestion," it seems to cover this condition of exalted receptivity which is sometimes found in a wakeful state.

Take now one of these transfer patients. He has heard or read of Luys' wonderful cures by means of transfer, and he comes to the laboratory full of faith. He sees the transferee thrown into a lethargy; he observes the solemn movement of the magnet by the doctor, and presently sees that the outward and visible signs of his malady declare themselves in the subject. Surely all these things are calculated to provoke a heightened receptivity of the all-pervading suggestion, a state identical with the first degree of hypnosis.

Hypnosis in Animals.—The subject of hypnosis produced by or in animals is very interesting; but as it has no very direct bearing on therapeutics, I will content myself with the most cursory reference to it.

About the middle of the seventeenth century, Father Kircher related how a cock placed before a chalk line, with his legs tied together, becomes motionless very soon, so that he remains cataleptic even when his legs are released.

Czermak, of Leipsic, repeated this experiment 1872, and found that, even dispensing with the chalk line and the tying of the legs, he could induce a cataleptic condition not only in

cocks, but in pigeons, rabbits, and crabs, by simply holding them in one position for a certain length of time.

Gregory tells how Lewis, a mesmerist, succeeded in mesmerizing a cat, and the duke of Marlborough was said to have been equally successful with a fierce dog. It has often been suggested that the celebrated Irish horse tamers may have relied on hypnotism.

Miss Harriet Martineau published her experiences with a sick cow, which she asserted she not only mesmerized but cured of some illness.

Moll and others have hypnotized frogs.

Certain animals seem able to produce hypnosis in others by means of fascination. When in Antwerp I witnessed a most revolting instance of this power. In the Zoölogical Gardens there, are a number of compartments occupied by various kinds of serpents, and into these a number of rabbits and pigeons are turned. The rabbits run, and the pigeons fly, most vigorously at first; but by degrees their movements become less active and more spasmodic, until one by one they become absolutely cataleptic, fascinated by the steady stare of the snakes. Some of the birds were actually riveted on the twining bodies of their charmers. As soon as the cruel hypnotists feel inclined, they swallow their innocent and unresisting victims. It is a most sickening sight, and it is astonishing that it should be considered a suitable show to expose to the morbid gaze of the public.

Some snake charmers seem able, by a process of stroking, to produce a cataleptic condition in the snakes, so that they become as stiff as rods.

Of course, in speaking of hypnosis in animals, we are to some extent inconsistent, for it can hardly be held that rabbits, etc., are capable of receiving suggestions in the same sense that we are. It would be probably more correct to speak of catalepsy in animals.

CHAPTER XI.

THEORIES OF HYPNOSIS.

I HAVE no intention of going into the theory of hypnosis or hypnotic suggestion here; but it may not be out of place to refer to some of the opinions which have already been expressed by others.

Mesmer accounted for all the phenomena with which we are familiar, by saying that they depended upon some subtle magnetic influence transmitted from the operator to the subject.

Reichenbach declared that what he called "odyle" was universally diffused throughout the material universe, as well in the human body as in magnets, crystals, plants, the sun, moon, and stars.

Braid exploded the pretentions of Mesmer, and showed that hypnosis did not depend upon any mysterious influence, and propounded the theory that hypnosis depended on an exhausted condition of the eyes, produced by fixed gazing, this tired feeling extending to the brain, giving rise to sleep.

Gregory adopted the older theory of a magnetic force, and fully accepted Reichenbach's explanation of odyle.

Dr. Liébeault's explanation is as follows:

The concentration of the mind on the idea of sleep, aided by fixing the gaze on a given object and the monotonous suggestions of the operator, produces a certain tranquillity, a cessation of thought, and a more or less pronounced alteration in consciousness. The patient's mind having been concentrated before hypnosis, he remains, as it were, in relation with the person who has been to some extent instrumental in producing this condition, and so hears his suggestions even when the brain sluggishly responds to or altogether refuses to notice other stimuli. All the sensations being as it were deadened or dulled, there is during hypnosis a great accumulation of nervous energy in the brain, which is directed into any

particular channel, by the judicious guidance of the operator, by means of suitable verbal suggestions, and thus a more or less indelible impression is made. When the hypnosis is ended, the nervous force is once more equally distributed over the body, to supply the sensory, motor, and special sense nerves, and so the remembrance of the impressions of hypnosis is either enfeebled or entirely obliterated, according to the depth of the sleep.

Heidenhain, the professor of physiology of the University of Breslau, first thought that hypnosis was due to "contraction of the arteries supplying the brain, reflexly produced by the sensory stimulation used to induce the hypnotic condition—due, therefore, simply to anæmia affecting definite parts of the brain." To test this theory he experimented with nitrite of amyl. He found, however, that he could hypnotize his subject, while his face was flushed, his head throbbing, and his arteries much dilated, and further that hypnosis produced immediately after inhaling the amyl was always deeper than when it was not use.

He now states that in his opinion "the cause of the phenomena of hypnotism lies in the inhibition of the activity of the ganglion cells of the cerebral cortex, . . . brought about by the gentle prolonged stimulation of the sensory nerves of the face or of the auditory or optic nerve."

Rumpf put forward a similar theory.

Bernheim believes that hypnotism is entirely due to suggestion, and that during this condition, there is an "increase of the reflex ideo-motor, ideo-sensitive, and ideo-sensorial excitability;" in other words, that the controlling or volitional portion of the brain is, for the time being, so far suppressed as not to be able to govern the lower or automatic parts of the brain, and so the faintest impression on the periphery of a nerve is transformed into an act or contracture; so also the suggestion of the feeling of pain or the relief from it is accepted without reasoning or question.

Many other explanations more or less plausible have been put forward; but as this is merely a practical guide, I will content myself by referring those of my readers who may wish to pursue the theoretic side of hypnotism further, to the works of Bernheim, Moll, Tuckey, Binet and Féré, Heidenhain, and Krafft-Ebing, already mentioned.

CHAPTER XII.

GENERAL CONCLUSIONS.

WHAT are now the practical conclusions which we are justified in drawing from our studies?

It can hardly be doubted any longer that a condition of hypnosis can be genuinely produced, and that this condition, though varying in degree, can be produced in a very large percentage of people.

This state seems to be characterized by an increased willingness to accept suggestions from without.

It can be induced by various processes.

Most persons seem able to hypnotize, though of course individual qualities tend toward success or failure in every operator.

The popular belief that weak-minded persons are alone, or specially, susceptible to hypnotic influence does not seem to be well founded.

Actual experience lends no support to the idea that the will of the patient is permanently subjugated to that of the operator.

The idea that the hypnotist, once having hypnotized a person, can in consequence always afterward exercise some influence over such person's thoughts and actions seems to be erroneous.

There appears to be no danger, as is often supposed, that subjects may not waken.

Hypnotism properly and conscientiously applied seems to be useful in certain medical ailments.

Also in some surgical conditions.

Moral defects appear in some cases to be amenable to hypnotic suggestion.

If hypnotism is honestly employed by competent operators, it seems to be free from physical, mental, and moral danger; the health, intelligence, and higher qualities of the subjects not appearing to suffer from its application.

Certain moral dangers are to be apprehended from the unscrupulous abuse of hypnotism.

Such dangers can, however, be easily avoided, it seems, by restricting the use of hypnotism to medical men (or women) or other authorized persons, and by adopting the precautions as to witnesses which have been recommended.

It appears advisable that lawyers should have some knowledge of the phenomena of hypnotism, and that a study of these phenomena should be included in a medico-legal education.

It seems also reasonable to urge that parliament should be asked to regulate the practice of hypnotism, so as to render it illegal to give public demonstrations of its powers or to use it privately unless the operator possesses either a medical qualification or a license. (The details connected with this part of the regulations could be safely left in the hands of the general medical council.)

Many further conclusions might be drawn, but I leave them to my readers.

All that I personally wish to claim, at present, is that hypnotism and hypnotic suggestion, with all the above "seemings" and "appearances," which I have used advisedly, should be accorded a fair and impartial investigation, and that those who have no actual experience of the subject, whether medical men or layman, should suspend their judgments until such investigation has been made.

I think it is only fair also to ask that in practically testing hypnotism as a remedial agency, it should be granted as full a trial as is afforded any other means of treatment by drug or otherwise. What I mean is this: Supposing any new medicinal substance is introduced, say exalgine for the relief of neuralgia; it would not be considered fair, if one dose failed to effect a cure, to declare that exalgine was of no value, neither would it be thought just to condemn the drug because it failed in one or two instances. Yet many people are ready to thrust hypnotism aside as useless because in any given case (and very often one is purposely selected because it has resisted every other treatment) one sitting has not wrought a complete cure; or because in several cases, perhaps in succession, no benefit has followed even a reasonable trial.

I know one gentleman who selected as a test case a pa-

tient suffering from what was considered incurable insanity, and by the issue of this one case hypnotism was to stand or fall so far as his observation was concerned.

Further, it does not seem to me to be reasonable to try every kind of medicinal and mechanical means in any given case which might seem likely to benefit by hypnotism, and then, when the patient is *in articulo mortis,* invoke the aid of a practised hypnotist, or perhaps make a maiden effort one's self, and, if failure naturally follows, lay the blame on the agency, instead of on its tardy or inefficient administration.

I was once summoned to hypnotize a lady who was dying for want of sleep after an operation. For eight days every hypnotic drug in or out of the Pharmacopœia had been given in rapid succession, and hypnotism was not tried until within about eight hours of the patient's death.

I am by no means advocating the indiscriminate use of hypnotism, nor am I by any means an enthusiast on the subject, of which I am so far merely a student, with a perfectly open mind as to the ultimate results of my investigations.

One thing, however, I am perfectly convinced of already, viz.: that it is not suitable for all cases, nor in every class of disease, and that any medical man who takes it up, expecting to find it a panacea, is doomed to certain and bitter disappointment. Hypnotic, like every other kind of treatment, will yield a large crop of failures, and many cases which may at first seem to benefit will relapse.

But is this sufficient reason for refusing to try it at all? The treatment—be it allopathic, hydropathic, homœopathic, electric, climatic, by massage, faith, or inoculation—which is invariably successful or universally applicable has yet to be discovered; but while we are searching for it, I do not think we can afford to overlook any means by which any ailment may perchance be modified or overcome.

The wise physician, who has to minister to minds as well as bodies, which are diseased or in danger, and who accepts his life mission as a sacred trust, should ever be on the alert to seize any hint which the chemist, electrician, sanitarian, moralist, or even charlatan can offer for the lightening of human suffering, and the cure or, better still, prevention of every or any malady.

This is the spirit which should ever actuate our noble pro-

fession, and I appeal with confidence to its members to exercise this spirit toward hypnotism. Let us weigh it carefully in the balance of honest examination; if it is found wanting, fling it aside: but if it is proved to be useful, place it in our ever-increasing armory, to be used not as a substitute for other well-tried and trusty weapons, but as an additional arm, to be wielded in our everlasting fight with death and his messengers, as tact and judgment may dictate.

CHAPTER XIII.

ILLUSTRATIVE CASES.

CASE I. *Obstinate Neuralgia in the Tongue, and Morphinomaniac Tendency.*—A. B., aged fifty-three, had suffered incessant and most distressing pain in the tongue and cheek for eight months. The pain was so acute that eating was impossible except when under the influence of morphia, and this drug had been so regularly taken that the dose had to be greatly increased, and frequently to be injected twice or even three times a day. It had also quite lost its power of producing sleep, having now the contrary effect of provoking wakefulness. At the end of eight months, the prostration was so great, owing to the loss of sleep and the small quantity of food taken, that the patient was only able to sit up a short time daily, and was confined to bed entirely some days, when the pain was so acute that the morphia seemed powerless to subdue it.

The patient was easily hypnotized, and passed into the cataleptic state, and the very first night slept well without morphia. On the second day the gastric disturbance due to the cutting off of the morphia became so urgent that I had to resume the injection of a small amount each night.

Sleep immediately returned, and it was not uncommon for the patient to sleep ten hours at a stretch.

The patient's strength quickly improved, the neuralgia abated, and the craving for morphia, which was present even when the pain was gone, was speedily overcome. She was hypnotized each night.

In five weeks the patient left home, looking better than she had done for years.

During the latter part of this time I tried to produce the sleep by means of written suggestions, giving the patient a paper on which was written, "Go to sleep at once, and you will sleep until 7:30: you will be much better in the morning and not require any morphia." This paper, conveniently

placed, acted splendidly, and even now, if at any time she feels doubtful about having a good night, she folds the paper, and looks at the words, "Go to sleep at once," and the effect is always satisfactory.

Case II. *Insomnia, with Great Mental Depression.*—P. G., aged sixty-five, a most active and intelligent manufacturer, through overwork and anxiety about several patents which he was perfecting, became a victim to insomnia. He had been suffering for months, and when first seen was in a pitiable plight—unable to work and unable to rest, terribly irritable, and a prey to all sorts of morbid notions.

He ridiculed the idea of hypnotism helping him, but was soon affected, though only to a slight degree. It was then suggested to him that he would sleep well and feel quite calm. Immediately he felt quiet and began to sleep well. He was only hypnotized twice, but at the end of three weeks reported that he was quite cured, sleeping every night like a child, and enjoying his days. He said he would gladly have given ten years off his life for the relief he had obtained.

Case III. *Severe Pain after Pleurisy.*—C. T., aged about forty, had a bad attack of pleurisy with effusion, eight months ago. For three months she was confined to bed, and during the last five months had never been free from pain. When first seen she was quite unable to do her work. Her breathing was difficult, and if she tried to take a deep breath the pain was intense. She could not lie on the affected side, nor lean toward it; she dare not stoop, and got very little sleep. The side was so painful that even the lightest pressure made her wince and scream out.

The patient became cataleptic, and while in that condition I rubbed the side freely, and assured her that the pain was gone.

On waking her in about five minutes I was as much surprised as my patient to find that she was absolutely free from pain, that her breathing was perfectly free, and that she could bend and stoop with ease, and bear a good blow on the side without pain. She returned in a week to report that the cure was permanent, and there has been no return for a year.

Case IV. *Obstinate Neuralgia of the Head and Right Arm.*—M. S., aged about forty-five, had suffered for over eight weeks from very acute pain in the head and down the right arm.

She had tried all the usual drugs, and was ordered by her doctor to the seaside as a last resource. Her pain seemed to be intensified by the change of air, and she simply came to me to know should she return home.

She was hypnotized quickly, and fell into a deep sleep, but was not cataleptic. The head and arm were rubbed, and cure suggested.

She wakened quite free from pain, and remained in Blackpool two weeks longer, but never had even the faintest suspicion of the pain again, and had not to be hypnotized a second time.

Case V. *Melancholia and Hypochondriasis.*—B. W., aged thirty, had, owing to a series of disappointments, become quite morbid, and wandered about all day, pondering on different methods of suicide.

He had lost his appetite, and complained of a feeling of constriction across his chest, and various obscure pains about the umbilicus, and want of sleep.

One sitting, in which he became slightly cataleptic, was followed by a wonderful difference in him, and he remained bright and cheerful for several days, eating and sleeping well, and free from pain. As he expressed it himself, "the world was changed, and he felt as happy as the day was long."

As there were slight threatenings of a relapse, it was necessary to repeat the hypnotism several times. He was called away from Blackpool, but left a firm believer in hypnotism, and is, I understand, keeping well.

After a lapse of several months, this patient called upon me and reported that he had not had any return of his morbid feelings.

Case VI. *Thorn in Finger.*—P. E., aged twenty-eight, while gathering wild flowers, got a large thorn in his middle finger; it entered just behind and was embedded under the nail. He had tried every means of extraction, and when first seen had had the thorn in his finger for twenty-four hours.

He was hypnotized, and became cataleptic, and while in that condition I was able to get the thorn out without pain, though the removal took several minutes, as the splinter kept breaking owing to its being sodden. This operation would have been too trivial to mention here, were it not for one circumstance.

Before I wakened the patient, I told him that he would have no pain when he woke, or subsequently, and that the wound would heal very quickly.

Knowing that the pain after the extraction of a thorn is generally very bad for a long time, I hardly believed my own assertion, but thought it might help to deaden the suffering. However, the patient told me a week later that he had never felt the least pain, nor tenderness on pressure, afterward, and that the wound was quite healed the next day.

Case VII. *Pain in the Face after Removal of Eyeball, with Consequent Insomnia.*—C. B., aged forty-eight, had had his left eye removed two years ago on account of a tumor, said to be fatty.

For some weeks he had had severe pain in the forehead and malar region, which prevented him sleeping.

The first time he was hypnotized the pain was quite obliterated, and he had a good night's sleep.

He was hypnotized on four subsequent occasions, as the pain threatened to return, but each time it was eased for a day or two, and each sitting was followed by refreshing sleep; whereas sleeping draughts failed.

This patient had to return to his work in the Midlands, and went away regretting that he knew of no doctor in his own town who practised hypnotism.

I fancied the tumor which had been removed was malignant, and that some secondary growth was the cause of the pain.

This patient has since died, and a post-mortem examination revealed the presence of a large tumor (sarcoma) pressing on the brain.

Case VIII. *Concussion of the Spine Due to a Railway Collision.*—H. A., aged thirty-two, was hurt in a collision six months before coming under my notice. When first seen, he complained of great weakness, pain in the upper dorsal and lumbar regions, also in the head and left shoulder and arm, and that his legs always felt cold. He was very depressed.

He was not a very susceptible subject, and never got beyond a feeling of drowsiness.

Yet he very quickly lost all his pains; his legs got warm, he gained strength, and in five weeks was able to take a journey to Scotland and walk quite a long distance. This gen-

tleman's recovery seemed to be hastened by several months, and his case leads me to suppose that in similar cases, if hypnotism was tried immediately after the accident, the subsequent shock might be greatly diminished in force.

Case IX. *Muscular Rheumatism, with Ulceration of the Throat.*—F. W., aged about thirty, had, when first seen, had a very bad night, and was in acute pain all over the body; she could only move with difficulty, and could not get ease in any position. Her throat was much ulcerated, and swallowing was very painful.

After about five minutes' hypnotic sleep, with rubbing and suitable suggestions, she felt so well that she wanted to get up and go about the house. She could also swallow without any trouble.

The pains did not return, except very slightly on the second day; but the throat got well at once, and, after a second sitting, the remaining pains were altogether obliterated.

Case X. *Pleurisy.*—J. W., aged about forty-five, had a sharp attack of pleurisy, to which she was very subject, and for which I had several times treated her non-hypnotically.

She was not seen until the second day, when the pain was abating, owing to her usual medicinal remedies; but still it was bad enough to prevent her taking a long breath, and she was also suffering from a violent headache, and cramp in her leg.

She was easily, but not deeply, hypnotized. The pain in the side, the headache, and the cramp were immediately removed, and did not return; and several days later she informed me that her general health had greatly improved.

Case XI. *Spasmodic Cough.*—S. J., aged twenty-eight, had had two very bad nights, owing to an incessant dry, hacking cough, which seemed due to some laryngeal irritation. He was hypnotized, and suitable suggestions made. He slept well that night, and had no further trouble.

Case XII. *Spasmodic Sneezing.* — The same gentleman was so much impressed by the cure of his cough that he again applied to me to know if he could be relieved of an affection from which he had suffered more than twenty years, and which he had hitherto regarded as incurable. Every morning on getting out of bed he was seized with violent paroxysms of sneeing, which lasted about ten minutes, and left him for a

time quite exhausted, with aching sides and his eyes and nose streaming.

One sitting was followed by complete relief.

Six months later, this gentleman assured me that he had never had any return of the sneezing.

Case XIII. *Toothache.*—S. B., aged about thirty-five, was suffering from severe toothache, and owing to swelling of the face feared to have the offending tooth extracted.

After five minutes of the lightest hypnotic sleep all pain was gone.

Case XIV. *Contusion of the Temple.*—A gentleman, in coming down-stairs, slipped, and struck his temple against the edge of a step. The pain in his head was very great, but, after a few strokings of the hand and suggestions of relief, was entirely dispelled.

Case XV. *Hysterical Pains.*—F.O., a young married lady, suffering from hysteria, complained of great pain in the abdomen, with distention, aching of the limbs, a general feeling of weakness, and an inability to walk any distance.

After one sitting all the pains were dissipated, and she was enabled to take quite a long walk, and after two more hypnotic sleeps her husband reported a wonderful change for the better in every way.

Five months subsequently, this lady's husband wrote to say that she had not had any relapse, and was remaining in good health.

Case XVI. *Pains in the Soles of the Feet.*—S. W., aged about thirty-five, had for years suffered every summer from intense burning in the soles of his feet, which was so bad as to prevent his walking, except with the greatest pain.

One sitting was followed by complete removal of the trouble.

Case XVII. *Obstinate Tic.*—M. R. had been suffering from distracting tic for five days, when first seen. A chemist had prescribed various remedies, and she had tried poultices, mustard leaves, and turpentine cloths. After hypnosis, she obtained immediate relief and a good night's sleep. The pain returned slightly in about twenty hours, but after a second sitting it was completely banished.

Case XVIII. *Menorrhagia, with Pains in the Arms, Weakness, and Nightmare.*—J. R., aged twenty-four, was greatly

pulled down owing to excessive and too frequent menstrual losses, and was suffering from acute neuralgic pain in the right arm and shoulder, and was subject to troublesome nightmare.

After being hypnotized once, she became regular. She was quite free from the neuralgia, slept soundly, and began to gain strength. In her own words, she "felt a new woman."

Case XIX. *Inebriety.*—F. L., a young man who had for some years given way to drink, and whose business prospects were seriously endangered. He had frequently signed the pledge, but invariably broke through his good resolutions.

He was found to be very susceptible, and became cataleptic. During his sleep, a dislike to alcohol was strongly suggested. For over nine months he has not shown the slightest inclination to take any form of intoxicant, though from the nature of his employment he is constantly exposed to temptation. As a safeguard, the hypnotic suggestions have been repeated at intervals of seven to ten days for the first five months, and since then much less frequently.

This patient informs me that even the smell of alcohol is positively offensive to him now.

Case XX. *Stammering.*—G. L., aged 41, has been all his life a great stammerer, and, if called upon to speak to a stranger, is sometimes unable to speak at all, owing to nervous dsypnœa.

He could only remain in Blackpool a short time, but at the end of six sittings was very much improved both in reading and speaking, and betrayed his weakness very slightly.

I frequently receive letters from this patient to say how much better he is getting on in his business now.

Case XXI. *Contraction of the Palmar Fascia.*—E. A., aged forty-five, a barber by trade, had suffered from a gradually increasing contraction of the palmar fascia in both hands, the right having been more or less affected for twelve years, and the left for eight years. He attributed the ailment to the cramped position of his fingers in shaving and hair-cutting; but it is interesting to note that his father had for years suffered from phalangeal contraction of the ring and little fingers of both hands. The patient was also subject to subacute rheumatism, but was otherwise healthy. About a year ago both hands became so painful that he was wholly unable to con-

tinue his work, and had to dispose of his business. Since then the contraction had remained about the same, but the pain continued very severe, and effort to do any work brought on most acute paroxysms. If he grasped anything round, such as a broom handle, the fingers became cramped, and he had to put them in hot water to free them.

The photograph, Fig. 4, shows the condition of his hands when he came to me for treatment on November 11th, 1890.

Fig. 4.

I hypnotized the patient readily by Liébeault's method, and he became cataleptic. I then extended all the fingers as fully as possible, and rubbed the palms freely, complete anæsthesia being present. I hoped in this way to be able to modify the pain, but hardly expected any further improvement.

The next day he returned, and reported that not only was the pain considerably lessened, but that he had great freedom in the movement of his fingers. I repeated the proceedings of the former day, and since this second sitting he has remained, for over six months, absolutely free from pain, and with perfect motion in every finger.

Fig. 5 shows the present condition of the hand.

Of course, from one case I do not for a moment wish to draw any hasty conclusion. But I do think a case of palmar contraction, apparently cured in two days without the use of chloroform or ether, tenotome or splint, is sufficiently interesting to justify its publication, and also sufficiently striking to warrant the trial of the means adopted, in similar cases, before having recourse to a difficult or dangerous operation, en-

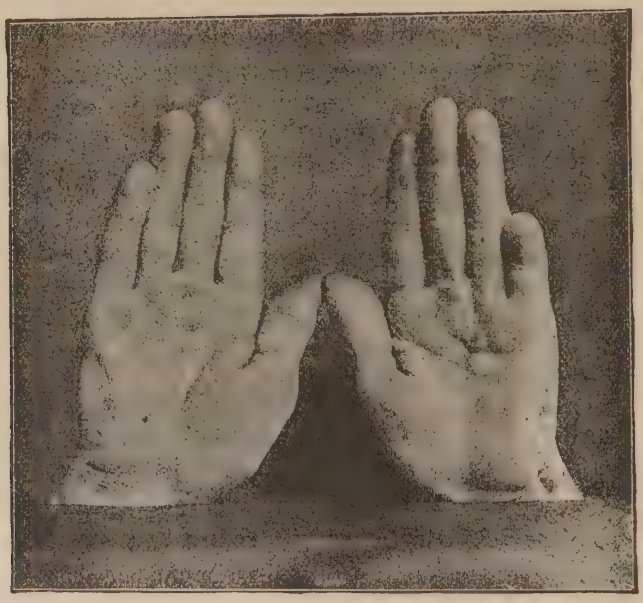


Fig. 5.*

tailing, even in the most brilliant instances, a tedious and irksome after-treatment.

This case was first reported in the British Medical Journal (Jan. 10th, 1891), as a case of "Dupuytren's contraction," not that I thought it was a typical case, but because it seemed to follow all the leading characteristics of that affection, as laid down by Erichsen.

As to cause, there were heredity, occupation, and rheumatism. As to symptoms and signs, there was present an undoubted fascial contraction affecting all the fingers. The

* The top of little finger of left hand cut off in machine accident.

patient had been seen by several surgeons, all of whom agreed it was the fascia, and not the tendons, which was at fault.

Exception has been taken to the diagnosis, and I am quite content to leave it as a peculiar case of fascial contraction. (Mr. Macready, F.R.C.S., wrote to the "British Medical Journal," saying that he could hardly accept the diagnosis; but after a careful inspection of the original photographs he assured me that he was quite satisfied that the case was one of "Dupuytren's contraction," though a rare form.)

Neither do I assert that all that has been done might not have been effected under an ordinary anæsthetic.

Case XXII. *Rheumatism in the Hip.*—B. G., aged thirty-six, had suffered for over ten years from great pain in the left hip, which was especially troublesome each morning on rising. The pain was frequently so acute that it made him scream out; through the day it wore off. He had tried so many remedies without securing any relief that he had begun to regard it as incurable.

After three sittings, in each of which he became slightly cataleptic, the pain entirely left him, and has not returned, though an exceptionally severe winter has passed since his treatment.

Case XXIII. *Anæmic Headache, with Insomnia.*—K. C., aged twenty-eight, was left after a severe illness with very marked anæmia. She had suffered for months, when first seen, from persistent and almost continuous headache and marked insomnia. She used to go to bed thoroughly exhausted and feeling very sleepy, would perhaps get an hour's broken rest, and then suddenly become wide awake, and remain so all night. Through the day she was weary and languid, felt sickly and disinclined for food, and was done up with the slightest exertion.

After the first sitting, she began to sleep soundly, getting about eight hours' refreshing sleep each night. The nausea disappeared, and she was able to eat heartily; she also felt able to do her work. At the end of a month she reported that she had only had two very slight attacks of headache and had not had a single bad night. Her color had returned, and she seemed greatly improved generally.

She had a second sitting, and has since (three months) remained quite well.

Case XXIV. *Chronic Constipation.*—M. G., aged fifty, had suffered for many years from very obstinate constipation, and was in consequence much troubled with piles, and had also a displacement of the womb due to loading of the rectum.

She was hypnotized with difficulty on the first occasion, but more readily, though not deeply, on the second and subsequent trials. After four sittings, her bowels began to act naturally and regularly every day, and her general health seemed greatly improved. This patient tells me that the bowels have acted daily without medicine for five months.

Case XXV. *Pains in the Chest, Mental Depression, Palpitation.*—H. G., aged twenty-seven, a very muscular young man, a blacksmith by trade, had for over six months suffered from pains across the chest, dyspnœa, and palpitation, which he attributed to his heavy work. At times his symptoms were very urgent, and he felt convinced that they would soon prove fatal. He became desponding, and at night his friends noticed that he would sit morbidly for hours, in an absent-minded mood, from which they could not rouse him.

At the first sitting he became profoundly affected. He returned in ten days, to ask that the treatment might be repeated, as the pain had been much less severe, and he had felt better fitted for his work.

I saw nothing more of him for over three months, when he came again to say that he had kept quite well since his last visit, but was again feeling some threatenings, which he believed another sitting would prevent developing.

It is now six months since his last sitting, and he has continued well.

Case XXVI. *Melancholia, Insomnia, Dyspepsia.*—M. E., aged forty-five, had for some months past felt wholly unable to attend to his business. He had nursed his wife through a long illness which ended in her mental derangement, and was, when first seen, completely broken down, unable to sleep, and suffering from nervous dyspepsia and headache; he feared that he too would soon lose his reason.

He was only hypnotized once, but at the end of nine weeks wrote to say that he had ever since his hypnosis felt "quite another man, able to do any amount of work and enjoy life."

After six months he again reported that he kept well.

Case XXVII. *Asthma.*—H. M., aged fifty one, had for a

number of years suffered from asthma every winter. When I first saw her she had had three particularly bad nights, unable to lie or sleep, and had not dared to go to bed. She was gasping, and her face was quite dusky.

She was only very lightly hypnotized, but felt her breathing greatly eased, and was able to go to bed at once and lie down; she slept soundly all night.

Two days later she was again hypnotized. The urgent symptoms having entirely subsided, she was ordered a quinine tonic; and after two months she called upon me to say she never had felt so well in her life, and that, though it was still winter, she had kept free from anything like a severe attack of asthma.

Case XXVIII. *"Brain Fog."*—F. L., aged forty-eight, a clergyman, consulted me for what he described as "brain fog." He had been accustomed to do a great amount of parochial work, and also to devote great attention to the preparation of his sermons.

Up to about a year ago, his work had been no trouble to him, and he had never suffered from headache. But for about twelve months, he had done his work with increasing difficulty; he had been unable to concentrate his thoughts for any length of time, and both in preparing and preaching his sermons he had felt as though there was a "mist in his brain." Lately, this had become acutely painful to him, as he had not been sure whether he had been preaching coherently or not, and he had felt convinced that he should have to resign.

He was hypnotized once only, but reported after three and a half months that he had never had the slightest confusion of thought, and had experienced greater ease than ever before in his work.

Case XXIX. *Neurasthenia.*—M. T., aged forty-six, a very successful American merchant, had, owing to overwork, become thoroughly out of health, sleepless, irritable, anxious, depressed, easily startled, restless, and physically weak; he could only read for about half an hour at a time, and then became confused, and suffered from pain in the head and spine. He expressed himself as thoroughly "tired of life."

The last two years had been spent in travelling all over Europe in search of health, and he had tried every form of treatment, including hydropathy, electricity, massage, and

even suspension. He had lost all hope of being cured, and, though he had no faith in hypnotism, had determined to try it, so that he could not be reproached with having neglected anything.

In all he had six sittings, on six consecutive days; and at the end of this time he was sleeping, walking, and eating well, and felt able to resume his work. He could not, however, believe that so marked an improvement would last, and fearing a relapse he remained in Blackpool a month. He then stated that not only had he kept well, but he had continued to improve, and was about to set sail for America, "feeling better than he ever remembered to have been in his life."

Case XXX. *Subacute Rheumatism.*—A. C., aged thirty-two, had been suffering from severe rheumatic pains in her arms and legs for some days, her suffering at night being especially great.

She became cataleptic and anæsthetic, and after one sitting remained quite free from pain.

Case XXXI. *Hepatic Pain.*—D. W., aged forty-nine, had suffered for two years from frequent attacks of pain in the region of his liver; latterly the pain had been constant, and accompanied by tenderness on pressure. It was so severe that he had been obliged to give up working, as a farmer. He had tried various drugs without benefit.

He was easily and deeply hypnotized, and after a single sitting was quite free from pain, and able to resume his occupation. At the end of a month he sent me word that he continued well.

Case XXXII. *Neurasthenia.*—J. H., aged forty-three, had, owing to domestic and financial troubles, got into a very miserable condition, beginning each day thoroughly unnerved, and weighed down with a constant dread of impending catastrophe. So great was this terror that he frequently could not summon up courage enough to go to his office, and his business suffered accordingly. His general health was also bad; he had lost his appetite, and complained of indigestion and flatulence.

After three sittings, all these nervous symptoms passed away, and he was able to face his work with a light heart; his appetite returned, his digestion became regular, and his sleep normal.

Case XXXIII. "*Pulsating Spine.*"—M. G., aged thirty-nine, was distinctly neurasthenic, but his chief complaint was that he was conscious of a "painful pulsation in the spine." Besides this, he had pain in the back of his head, palpitation, pain in the bowels, hoarseness, and general debility. He had regarded himself as an invalid for a couple of years, and had given up all his usual occupation and recreation. Formerly he had ridden a good deal, but had to abandon this, as it greatly aggravated his spinal pain. He had seven sittings, at the end of which he was stronger and more cheerful, and almost entirely free from his former symptoms.

After an interval of three months, he was continuing better.

Case XXXIV. *Dysmenorrhœa.*—M. B., aged twenty-two, suffered most intense pain at each menstrual period. At times she would writhe on the floor. The pain was not occasional, but had been present every month since she had begun to menstruate.

She was first hypnotized a week before, and a second time two days before, her period.

Menstruation set in and continued absolutely painlessly.

She was hypnotized twice in the succeeding month, and has now had six perfectly normal periods, entirely free from pain.

Case XXXV. *Ovarian Pain, Dysmenorrhœa.*—F. C., aged twenty-nine, had for about six years suffered from very painful menstruation, for the relief of which she had undergone three operations (dilatation of the cervix). After one of these operations, uterine and ovarian inflammation set in, and she was confined to bed for weeks. Her after-condition was worse than before, for she was reduced to a state of invalidism owing to constant ovarian pain, and had to abandon her occupation as a teacher. Several eminent gynæcologists were consulted, and all urged that oöphorectomy was the only alternative to years of misery.

She was with difficulty very slightly hypnotized, but at the end of a fortnight the ovarian pain had disappeared, and she had a painless menstrual period. She was able to walk for hours every day, and has since resumed her work.

Case XXXVI. *Too Frequent Menstruation, Anœmia.*—A. M., aged twenty-four, had for some time past suffered from too frequent menstruation, her periods coming on every fortnight,

and lasting six or even eight days. She had become very anæmic, and complained greatly of feeling faint and dazed, and of headache.

She was hypnotized on four occasions. The interval between her periods became quite normal, and she regained her color and strength, becoming quite bright and free from headache.

Case XXXVII. *Painful Varicocele.*—H. R., aged twenty-two, had a slight varicocele, which caused him considerable pain if he walked any distance or had to stand long. He had been advised to undergo any operation for its relief, and had almost made up his mind to submit.

He was easily and very profoundly hypnotized, and two days later walked for five hours without resting and without once being conscious of even discomfort. At the end of a week he had a second sitting, and has since (four months) remained free from pain.

Case XXXVIII. *Abscess in Jaw.*—T. S., aged twenty-eight, came to me one evening with one side of his face greatly swollen. He complained of excruciating pain, due to a large abscess at the root of one of his teeth. He was hypnotized, and passed into an advanced stage. On being aroused after five minutes' sleep, the pain was absolutely gone. After three hours (spent in practising with some musical friends) the abscess burst, and discharged itself painlessly.

Case XXXIX. *Curious Case of Nervousness.*—H. J., aged twenty-four, a young clergyman, who preached with great fluency, had for some weeks suffered from a most embarrassing form of nervousness. He invariably got through his sermon well, but when it was finished he found himself wholly unable to pronounce the customary benediction.

He was hypnotized one afternoon, and the same evening found himself quite at ease in performing the concluding portion of his service and has not since (six months) had any return of the trouble.

Case XL. *Cocaine and Morphia Mania.*—G. H., aged thirty, a medical man, had become a complete wreck owing to his having got into the habit of injecting morphia and cocaine. I first saw him in consultation with two doctors (one a very eminent professor of medicine), and found him in bed, with the restless appearance of a lunatic. He admitted that

his daily allowance was eight grains of morphia and eight grains of cocaine. I hypnotized him, and he became much calmer. He gave up the cocaine at once, and within a week had got the morphia down to two grains; there was no doubt about the reduction, for a college friend of his undertook to stay with him, and take charge of his syringe.

During the week he had five sittings. He was then so much better, and felt so confident in his own powers of restraint, that he insisted on returning home, and beginning his work again. I am informed by his friends that he relapsed.

Case XLI. *Moral Perversion in a Child.*—S. T., aged eight, had for a couple of years given her parents the greatest anxiety, owing to the most unaccountable paroxysms of malicious conduct, during which she was more like a youthful maniac than a naughty girl. She would in the most deliberate and cool manner plan how to inflict bodily pain on others. For example, she would go up to her nurse and caress her, and, while the servant was reciprocating the apparent affection, would suddenly strike her in the abdomen with all the strength she could muster. At other times she would lie awake for hours, all the while feigning sleep, and when her mother was asleep she would leave her own bed and climb on to that of her mother and kick her on the breast as hard as she could. As a result of one of these midnight attacks the mother had a swelling in one breast which she feared would develop into cancer. This child was particularly muscular and seemed herself to be almost insensible to pain; she would laugh if she was flogged and say she liked it. Every means had been exhausted in the attempt to correct this girl's habits, thrashing, seclusion, cold shower baths, low diet, etc., but all to no purpose. She became more violent and callous and absolutely disobedient.

Her parents thought her "possessed of a devil," and dreaded her growing up, fearing that she would end in an asylum or on the gallows.

After one hypnotic sitting, the child's character was completely revolutionized; she became obedient, gentle, loving, and thoughtful for others.

Case XLII. *Dishonesty.*—T. W., aged ten, was constantly thieving. He would rob his school-fellows', his parents,' or his brothers' and sisters' things. He had more than once got

articles from shopkeepers in other people's names. He was an inveterate liar and most disobedient. His father had almost decided to ask the magistrates to send him to a reformatory.

After the first sitting there was a marked improvement in his conduct, and he was hypnotized once a week for some time.

There are no complaints of his conduct now.

Case XLIII. *Labor during Hypnotic Sleep.*[38]—Instances in which hypnotism has been employed with more or less success during labor have been recorded by Liébeault, De Jong, and others; but I think the case which I now present is the first of its kind in England, at least within recent years.

V. S., aged fourteen years and seven months, was brought to me from an inland town last November (1890), with a view to making arrangements for her approaching confinement, she being then in the seventh month of pregnancy. The regular medical attendant now stated that he feared the patient's confinement would be fatal.

The patient being so young and of stunted growth, certainly seemed likely to have a difficult labor. I therefore determined to try if hypnotism would be of any service, her parents readily consenting to the experiment. She was easily hypnotized and became cataleptic; anæsthesia was also present. I suggested that she should sleep through her confinement. After this she was regularly hypnotized once a week, in all twelve times prior to her confinement. At the last sitting the anæsthesia was so profound that her cornea could be rubbed with the finger without disturbing her in the least.

On February 17th, 1891, I was called to her at 7:30 P.M., and found her in labor, the os slightly dilated, and the pains recurring about every fifteen or twenty minutes. She was, however, walking about. I ordered her to bed and hypnotized her, telling her to remain asleep until I told her to waken, and further suggesting to her to "bear down" whenever a "pain" came. I then left her and returned at 9:30 P.M. She had slept during the interval, and the contractions were now much more frequent, and, during each, she could be seen to assist greatly by forcing down. The nurse now got her out of bed to pass water, which she did without waking, and also had her bowels

relieved. Soon after she vomited freely; but this too failed to rouse her.

The "pains" steadily increased in violence and frequency, and as each came she groaned loudly, but all the time assisted herself as directed, and even when the final "crowning pains" came she did not cry out, but pursed up her mouth and powerfully aided the expulsive efforts of the uterus.

At 11 P.M. she was delivered of a female child weighing eight and one-quarter pounds, absolutely without aid. The placenta followed in ten minutes. The patient having been bound up and everything put right, I wakened her at 11:30 P.M. by blowing on her eyelids. She opened her eyes instantly and said she felt "all right;" that she had no recollection of anything which had happened since she went to sleep; had no idea how long she had slept, and that she was quite positive that she "had had no pain." Since then she has made a good and speedy recovery, and the baby is thriving well.

Now, had this case been left absolutely to nature, it seems probable that the labor would have been much more protracted, for the patient would have exhausted herself by screaming in the ordinary fashion, and this again would have prevented her from aiding as she did. If chloroform had been given, the screaming would have been suppressed, but the patient would not have been able intelligently to respond as she did to the last to every suggestion.

That the patient was in some sense conscious of the pains was evident from her groans and her aid; but the fact remains that they did not waken her, and that she had no memory of them on being awakened; and, further, it is clear that the hypnotism had no injurious effect on either the mother or the child.

I advise any one who wishes to try this method to have at least six preliminary sittings so as to accustom his patient to the process and also to thoroughly test to what degree of hypnosis he can bring her.

I am quite sure it will not succeed in every case; but whenever a woman is known to be susceptible to hypnotism and to exhibit anæsthesia, I think it will be justifiable to try this plan if circumstances warrant any interference at all with natural labor.

CASE XLIV. *Traumatic Contraction of Fingers Treated*

during Hypnosis.[39]—T. H., aged about thirty-six, consulted me on the 28th of November, 1890. About a year previously he cut the palm of his hand at the outer side, and since then his little finger has been gradually contracting, and latterly the ring finger has been following. Photographs are appended to show the condition of the fingers before treatment.

The patient was hypnotized after a good deal of trouble, possibly due to the fact that he "did not believe in it."

Fig. 6.—Photograph Showing Front View of the Hand, Nov. 28th, 1890.

During hypnosis the fingers were forcibly extended and absence of pain suggested. The patient did his work next day as usual, without any discomfort.

Two days later he was again hypnotized, and the extension carried still further.

Immediately on going home he played his violin for two hours, "just to test his fingers," the hand affected being his left. This test required the constant exercise of the fingers, but he felt no pain. Owing to the previous contraction he had not been able to play his violin for nine months.

On the 3d of December, 1890, he came to report that his hand continued all right, and the next day the second photographs were taken.

This man's fingers have kept right since, and he can easily extend the little finger behind the level of the others.

This case was clearly one of traumatic contraction, and I have no doubt the fingers could have been extended under the influence of an ordinary anæsthetic; but if they had been,

Fig. 7.—Photograph Showing Lateral View of the Hand, Nov. 28th, 1890.

would the patient have been able to fiddle for two hours the same evening?

Case XLV. *Cinder Mark Removed.*—C.F., aged sixteen, had an ugly blue mark about half an inch long on the right forearm near the wrist, the result of a cut into which cinder grit had got when she was a baby. It looked like an Indian ink mark.

She was easily hypnotized and became profoundly anæsthetic and cataleptic, so that I was able to cut out a piece of skin, remove the whole of the pigment, and close the wound with

three catgut sutures without the slightest wincing on her part. There was no after-pain, and the wound healed by first intention. The stitches were withdrawn on the second day.

Case XLVI. *Blistered Feet.*—F. H. had been forced to walk a very unusual distance, and was suffering greatly from blistered heels and insteps.

He was hypnotized, and absence of pain suggested. On waking, all the smarting had disappeared and did not return.

Fig. 8.—Photograph Showing Front View of the Hand, Dec. 4th, 1890.

Case XLVII. *Inebriety.*—J. O., aged fifty-six, had for years been addicted to drink, and during the last seven or eight years had hardly ever gone to bed sober. He held an official position, which he had been allowed to retain owing to the forbearance of his superiors, but which was now endangered.

He could not sleep at night, and his appetite was gone.

As he was only able to stay in Blackpool a short time, I could not hypnotize him more than eight times. At each sitting the greatest aversion to alcohol was suggested, together with sound sleep, good appetite, etc.

After a considerable lapse of time, he writes to say that he has not the slightest desire for alcohol, that he sleeps and eats well, and feels altogether better.

Case XLVIII. *Inebrity.*—T. R., aged forty-eight, a professional lecturer, had for about ten years taken stimulants to excess, but for the past three years had become a confirmed inebriate, and had constantly to break his appointments owing to incapacity. So violent was his craving for drink at times that,

Fig. 9.—Photograph Showing Lateral View of the Hand, Dec. 4th, 1890.

to use his own language, "if murder had been the price of whiskey, he would have paid it, and taken the consequences."

After the first hypnotic sitting all appetite for alcohol vanished, and he is now enabled to do his work without artificial stimulation, sleeps well, and is not like the same man.

Case XLIX. *Diabetes.*—During a recent visit to Dublin, I was going over the Mater Misericordiæ Hospital with the consulting physician, Dr. Cruise, and was discussing with him my belief that in certain diabetic cases it would be worth while

to try hypnotism, on the ground that diabetes is frequently due apparently to nervous causes.

We asked Dr. Joseph Redmond, one of the physicians, if he had a diabetic patient in the hospital. He told us there was one just about to be discharged as incurable, whose case seemed likely to end fatally very soon.

I begged that he might be kept in the house a while longer as a test case.

By the courtesy of Dr. Cruise and Dr. Redmond, I am enabled to append the following note:

"J. S., aged twenty-four, commercial traveller, was admitted into the Mater Misericordiæ Hospital on 3d April, 1891, under the care of Dr. Joseph Redmond.

"On admission he appeared weak and emaciated, with a hectic flush. He complained of great thirst, especially at night, and an extraordinarily copious discharge of urine—twenty pints in the twenty-four hours. On examination the urine was found highly saccharine.

"There was no family history of the disease, and the patient stated that he had been fairly temperate, only occasionally exceeding somewhat in the use of porter.

"The patient states that about four months ago, he noticed the great thirst, with increase of appetite and of urine; that he also began to get thinner and weaker, noticed that his sight was dim, and suffered from pains and weakness in the back and legs, and a sense of constriction in the chest and difficulty in breathing.

"The treatment adopted was a regulated diet, with codeia in doses beginning at one-quarter grain, increased to three-quarters grain, several times a day.

"He steadily and rapidly grew worse, and the case was considered hopeless."

On the 17th April, 1891, I saw him and found him a good hypnotic subject. During hypnosis I suggested to him that his thirst would diminish, that he would gain strength, lose the pains in his legs, and the tightness in the chest, etc.

When he wakened he said he felt stronger, could breathe more freely, and walk better.

Since then he has been hypnotized at short intervals by Dr. Cruise and the suggestions repeated.

From the first day up to the time of Dr. Cruise's note

(May 19th, 1891), there has been a marked improvement—the thirst abating, the breathing continuing easier, the pains lessening, strength being regained, and the urine decreasing to half the quantity.

What the ultimate result in this case will be I cannot predict, but hope that Dr. Cruise will publish the full details later.

In any case, the mere rendering of the man more comfortable, even if only for a while, was well worth the trouble expended.

Case L. *Painful Cicatrix.*—E. M., aged about fifty, had cut the back of her hand severely some years ago; the cicatrix had become acutely painful.

She was easily hypnotized, and became cataleptic.

The hand was rubbed and absence of pain suggested.

There has been no return of the suffering.

BIBLIOGRAPHY.

1. Surgical Operations in the Mesmeric State: John Elliotson, M.D., F.R.S., London, 1843.—2. Mesmerism in India, London, 1846: The Introduction of Mesmerism with Sanction of Government into the Public Hospitals of India, London, 1850.—3. Neurypnology, or the Rationale of Nervous Sleep, by James Braid, M.R.C.S., London, 1843. Braid first employed the term "Neuro-hypnology," but subsequently cut it down to "Neurypnology."—4. Animal Magnetism, 1850.—5. The Might Curative Powers of Mesmerism, Proved in a Hundred and Fifty Cases: Thos. Capern, London, 1851.—6. Du Sommeil, et des États Analogues, Paris, 1866.—7. De la Suggestion et des ses Applications à la Thérapeutique, Paris, 1886. English Translation, Suggestive Therapeutics, New York and London, 1889.—8. Psycho-therapeutics, Wood's Med. and Surg. Monographs, Sept., 1889.—9. Fortnightly Review, June, 1890.—10. Animal Magnetism, 1851.—11. Suggestive Therapeutics, 2d edition, London, 1890.—12. An Experimental Study in the Domain of Hypnotism: R. Von Krafft-Ebing, London, 1889.—13. Magnetism and Hypnotism, The Forum, January, 1890.—14. Illustrations of the Influence of the Mind upon the Body.—15. Pathology of the Mind.—16. Influence of the Mind upon the Body.—17. British Medical Journal, Nov. 15th, 1890.—18. Animal Magnetism: Gregory, 1851.—19. Matthew, xii. 24.—20. Burton's Anatomy of Melancholy.—21. Should Hypnotism have a Place in Recognized Therapeutics? 1890.—22. Suggestive Therapeutics, 2d Edition, 1890.—23. Hypnotism, or Animal Magnetism, 1883.—24. An Experimental Study in the Domain of Hypnotism, 1889.—25. Hypnotism, 1890.—26. Psycho-therapeutics, 2d Edition, 1890.—27. See Experiments of Ochorowitz and Heidenhain, p. 43.—28. Pathology of the Mind.—29. Hypnotism in Relation to Crime and the Medical Fac-

ulty: A. Taylor Innes; Contemporary Review, Oct., 1890.—30. Hypnotism, Crime, and the Doctors, Nineteenth Century, Jan., 1891.—31. The Latest Discoveries of Hypnotism, Fortnightly Review, Aug., 1891.—32. De la Suggestion et du Somnambulisme dans leur Rapports ave cla Jurisprudence de la Médecine Légale, Paris, 1888.—33. Hypnotism, 1890. —34. Fortnightly Review, June and Aug., 1890.—35. Animal Magnetism, 1851.—36. Animal Magnetism: Binet and Féré, 2d Edition, 1888. —37. Lancet, Dec. 6th, 1890.—38. Published in British Medical Journal, Feb. 28th, 1891.—39. Published in the Lancet, April 18th, 1891.

A PRACTICAL MANUAL

OF THE

Bacteriological Analysis of Water.

BY

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A PRACTICAL MANUAL OF THE BACTERIOLOGICAL ANALYSIS OF WATER.

ALTHOUGH, since the labor of M. Pasteur, there has been considerable interest excited by the knowledge of the existence of bacteria diffused in waters, it is only since four or five years that such analyses have entered into the daily practice of bacteriological laboratories and institutes of hygiene.

M. Pasteur, to whom we are indebted for such great discoveries in micro-biology, has not attacked the question of the quantitative relations of bacteria; he has confined himself to saying, in a paper which in 1878 was officially communicated to the Academy of Sciences by himself and M. Joubert, that spring waters are destitute of microbes; that the distilled waters of laboratories, on the contrary, always contain them; that river waters, notably the Seine, are full of them, even in a drop; and that in this weak dose they give birth to various kinds of microphytes.

Almost simultaneously M. Pasteur and M. Joubert, in France, and Mr. Burdon Sanderson, in England, furnished general indications of the wealth of waters in bacteria; but these indications were not mathematical, and could not be compared with the analyses which were actually published; hence they were neither very useful nor very interesting. One will grasp the vagueness of the statements of these various authors when he is told, as is stated below, that one drop of the water of the Seine drawn from above Paris contains more than 1,000 bacteria, and that below Paris this number may amount to 10,000 bacteria and often more; certainly there are sufficient microbes to exercise the wisdom of a scholar who might desire to study the biochemical and pathogenic func-

tions of these different micro-organisms for many years to come.

The first statistics relating to the bacterial wealth of waters were published by me in 1879, under the form of a comparative table comprising the waters of condensed atmospheric vapor, the meteoric waters, the waters of the Vanne, of the Seine drawn at Bercy, and the waters of the sewer. Since that time, I have had the satisfaction of ascertaining that this preliminary work has served as so many landmarks placed on a path to-day followed by a great number of experimenters; but I must call attention to the fact that during eleven years the bacteriological analyses of waters were practised solely in my laboratory at the Observatory of Montsouris.

These analyses should and can be effected everywhere. The processes which were difficult to apply and expensive, and which I employed at that time, have been replaced by others which are much more simple, though I will not say more exact. In the following pages I propose to describe those which, to my mind, are most practical and most worthy of recommendation, not only to professional bacteriologists, but to physicians and to pharmacists who often have at their disposal only too limited a material and little time to devote to this sort of work.

The bacteriological analysis of waters consists of five very distinct operations—

1st. The collection of specimens.

2d. The transportation of the specimen.

3d. The quantitative analysis.

4th. The qualitative analysis.

5th. The reading of the results obtained.

We find our study, then, clearly divided into five general chapters, which we will go over successively, and which represent very exactly the various steps in a bacteriologic investigation.

The title of Chapter IV., laconic as it may seem (the qualitative analysis), indicates the most difficult part of the micrographical analysis of water; for while it is comparatively easy to establish the amount of cubic centimetres of bacterian organisms contained in such or such a water, it is infinitely more delicate to determine the nature of the species whose

propagation has taken place in the beef tea or gelatin, and especially to establish the pathogenic power of these microbes with reference to the human race. This is the chief value of the bacteriological analysis of to-day. Later, the manufacturer who has recourse to fermentations for the fabrication of the various products utilized in provisions, for the obtaining of coloring materials, etc., will also resort to bacteriology for the purpose of learning for himself if the waters which he uses are useful or injurious to his industry. But now, I repeat, the most essential point of bacteriological analysis is to enlighten people upon the harmfulness or harmlessness of the waters which they drink.

CHAPTER I.

THE COLLECTION OF WATERS.

THE object of studying the bacteria of water quantitatively and qualitatively is to observe only those bacteria which are held in suspension in this water; hence the necessity of avoiding, by every possible means, contamination by foreign organisms of the liquid examined.

This simple observation supplies the experimenter with the nature of the precautions with which he must surround himself in the very important operation of collecting the water.

He should employ for this purpose only clean and sterilized vessels; that is, those containing no organic matter and which have been purified of every germ.

Formerly I made use of tubes or of balloons tapering off into a point sealed at a high temperature; the capillary extremity was broken off in the water which one desired to collect. Under the influence of the partial vacuum produced by the rarefied air through the heat, the water flowed into the tube or into the balloon and half filled it; then the capillary point was sealed again. This mode of procedure is the most exact and the most scientific; but aside from the fact that it is not easy of application in the hands of one who is not an expert in micrography, the sealed balloons with pointed ends are very fragile and are not conveniently transportable; hence, in many cases, it is necessary to substitute an apparatus which is less delicate to manipulate.

One may employ for this purpose glass bottles of 100 c.c. to 200 c.c. capacity, simply closed with a cork, and which have been treated in the following way:

The bottles, first provided with a stopper of cotton-wool, are placed in an air bath whose temperature is gradually raised to 200° C. At the end of a half-hour the germs contained in the interior of the bottles may be considered absolutely destroyed. The bottles being cooled, the scorched cot-

ton is removed with pincers or metallic wire and replaced by corks lightly carbonized at the surface by an alcohol lamp or gas jet. The bottles are then surrounded by a sheet of paper and protected in this way. It is in this manner that I intrust to the agents, charged with the collection of the water to be analyzed, the vessels destined to receive it. These bottles remain sterilized indefinitely, first because they are purged of every microbe and of all humidity, and secondly because the exterior part of these bottles, especially the circular slit which separates the neck from the stopper, remains protected from atmospheric sediment and all other impurities.

It is unnecessary to say that, in the absence of a hot-air oven, the bottles can be placed in a steam bath at a temperature of 110° C.; they are then sterilized by heating them slowly in every direction in a large flame in such a way that they may be held for some instants in a temperature of about 250° C. In the latter case it is an advantage to use small balloons or flasks or tubes of thin glass; the risk of having the vessels broken by the unequal distribution of heat will be considerably diminished.

The following are the various modes of collecting specimens of water:

A. *Running Water Accessible to the Hand.*—The sterilized bottle being rid of its protecting envelope of paper at the place of operation, is uncorked and plunged some centimetres deep into the liquid mass, the neck of the bottle being directed up the river; that is, against the current. The filled bottle is taken out of the water, closed with the cork stopper which has been constantly held at the end of the fingers, without touching clothes, ground, or any other object.

B. *Running and Shallow Water.*—It is necessary in this case, especially if it be a spring or a drain emerging out of the soil, to take all possible precautions to avoid stirring up the mud or sand which forms the bed of the spring or of the brook.

Some very pure waters gush out upon the ground with a certain violence, causing whirlpools of sand and of muddy or calcareous matters, often defiled with microphytic productions; in order to obtain the exact bacteriological composition of these spring waters it is evident that they should be drawn at a sufficiently removed distance from the place of their

emergence. The springs of the Avre that one happens to strike at Paris, and among them the source of the Graviers, present the very troublesome peculiarity which I have just mentioned.

C. *Water Inaccessible to the Hand, Stagnant or Running.*—We desire, for instance, to draw into the upright branch of the siphon, water which has arrived from the Vanne at the reservoir of Montrouge, in the aqueduct of the Dhuis, the canal of the Ourcq, a well, a cistern, a collector of drainage; for this, the bottle is weighted with a mass of lead, suspended by the neck by means of a string or flexible metallic wire knotted about it, uncorked and plunged into the water at a depth of some centimetres. The bottle is drawn up when full, corked, then unweighted and freed from the suspending wire.

D. *Running Water in Pipes.*—Excepting in the case of fountains incessantly gushing out, the faucets giving access to the water which is to be analyzed should be large; it is not rare to see the liquid run muddy and disturbed from the influence of strong pressure; but it does not take long for the water to resume its normal clearness and become rid of the various matters which might accumulate and remain in the examining tubes. A full flow of the water should be kept up for ten minutes before being collected. Otherwise we would be apt to collect not only water defiled by earthy deposits, but warm water which has remained a long time in the secondary pipes and which is different from that which circulates in the primary pipe.

E. *The Collection of Water at Various Depths.*—We may be interested in knowing the abundance of micro-organisms of the various liquid strata which exist in a river, a reservoir, or a well. Here it is absolutely necessary, in order to work with precision, to make use of the sealed vessels. The apparatus that I am about to describe, represented by Fig. 1, may serve this purpose; it was submitted to the public in 1886, at the barracks of Loban, during the exposition of the Society of Public Medicine and Hygiene.

It is composed of a little flask M, of about 50 c.c. capacity, with a point bent like the neck of a swan P′; it is held vertically in a metallic support *aaa*. The system, weighted with a leaden weight of two or three kg., is suspended by a strong,

sfender cord, graduated in metres and fractions of metres by means of rings and knots. This cord passes through the rings *d d*, separated by metres, a copper wire ending in a ring A, embracing the fragile bent neck P′ of the flask.

The instrument being lowered to the desired depth, by a sudden and sharp movement one raises the ring which cuts off the capillary point of the sealed vessel, and the water passes into the sterilized flask, in which a partial or complete vacuum has been produced.

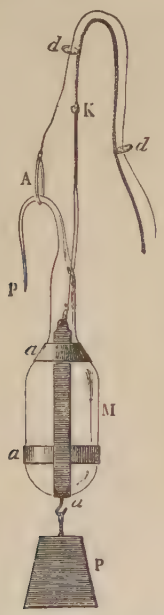

Fig. 1.—Apparatus for Collecting Water at Various Depths.

F. *Collection of Rain Water.*—As the analysis of rain water may, in some cases, give useful information about the microbes of various regions of the atmosphere, it is necessary that it be gathered with special precautions. I will describe the apparatus that I have employed for this pur-

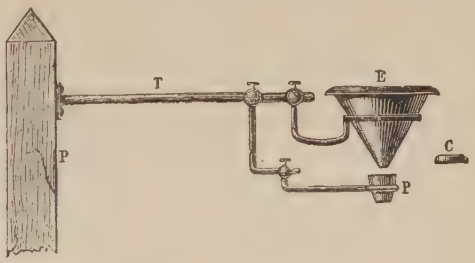

Fig. 2.—Apparatus for Collecting Rain-water.

pose for fifteen years at the Observatory of Montsouris. It is very simple, as may be judged by examining Fig. 2; but it ought to have certain peculiarities which I will mention.

Upon a horizontal iron shank T, solidly screwed to a vertical wooden post P, planted in the ground, is fixed, at a height of two metres, a funnel E, in copper, nickel or silver plated; the latter is carefully heated up at the seat of experiment. Under this funnel is placed a crucible of platina, previously brought to a red heat.

The construction of this rain-collecting apparatus must be such that, without touching other parts of the apparatus, the platina vessel P′ may be withdrawn and replaced with the

greatest facility; this will permit the separate gathering of the rain at the commencement, during, and at the end of showers or storms. The little lid C may be used later to preserve the contents of the crucible from atmospheric impurities which it might receive during transportation and by manipulations in the laboratory.

I am very particular to see that the apparatus is suspended as high as possible. If this important precaution be neglected, if the apparatus, for instance, is placed at 50 cm. or 1 metre from the ground, it happens often that the rain, in falling upon the softened earth, causes drops of muddy water to rebound into the funnel and into the receiving vessel; this adds considerably to the bacteria in the rain water.

I do not like to leave the apparatus exposed to the outside air during long periods, especially during the intervals when the rain ceases; for during the clear periods the dust of the air enters the funnel, and the shower which follows mingles with it in the receiving vessel and, as is evident, augments the quantity of microbes in the rain water. On the other hand, when the rain is fine and continuous, as may occur at the rainy periods of autumn and spring, the udometer may remain exposed for a dozen hours; but then it is important, in seasons when the temperature rises beyond 10° to 12° C., to chill the rain water as it falls into the receiving vessel. For this purpose I place the vessel in a long tube of silvered copper closed at its lower extremity; this is plunged in a cylindrical vessel hermetically closed, containing sulphide of carbon, in which the air is agitated by means of a suction pipe; in this manner the rain is kept at about 0° C.

For this apparatus, which is constructed under my directions since more than eight years by the firm of Wiesnegg, may be substituted with advantage a simpler one, by screwing the copper receiving tube to a recipient containing either methyl-chloride or liquid carbonic acid; the cooling power of the apparatus is regulated by an escape cock which permits the vaporization of these gases liquefied under pressure to be hastened or retarded. The sterilization of the tube which receives the rain water is effected by placing the vessel horizontally and moving about in the tube a little wad of alcohol-soaked cotton-wool and setting this on fire. To avoid accidents, the refrigerating apparatus should be put in operation at this moment,

and produce a cold below 0° C.; this by no means injures the superficial heating which suffices to prevent the condensation of the water and to burn the germs adhering to the inner walls of the tube.

D. *The Collection of Snow and Hail.*—Snow and hail are very easily collected by exposing to the open air, at the time of their fall, a cylindrical box of copper, nickelled or silvered and well heated. The collection having been made, the box is covered by its lid equally sterilized; then this udometer, as primitive as it is exact and simple, is exposed to the heat of a stove brought to about 30° C. At the end of from five to ten minutes, the snow and hail are liquefied, and this melted water is then treated like ordinary water. A weighing made before and after the exposure gives, by a simple calculation, the depth of rainfall corresponding to the fall of snow or hail during the exposure of the box.

There is one cause of error connected with the collection of specimens of water for micrographic analysis, the consequences of which many scrupulous minds have exaggerated; I speak of the accidental contamination of these specimens by the dust floating in the atmosphere. It is evident that all operations of collecting water being effected in contact with the air, this latter may accidentally deposit one or two germs in the water intended for analysis. But I may ask, in what way can this falsify the result of the enumeration of the bacteria? A microbe lost in 150 c.c. to 200 c.c. of water, if by the greatest chance it should be caught by the analyst who ordinarily works with 2 c.c. to 3 c.c., would not augment the quantity of bacteria in the water to be examined. Generally, in this species of analysis, units are for the most part ignored; sometimes, even with river waters, it is absurd to take account of tens and hundreds.

It is of much more importance to be cognizant of another serious cause of error which may, unknown to the experimenter, alter the exactness of micro-biological analysis—the rapid increase of bacteria in the water when left to itself.

CHAPTER II.

THE TRANSPORTATION OF WATER.

If it were possible, it would be preferable to make the micrographic analysis of the waters upon the very spot where they have been collected, or at least to institute there the preliminary experiments; but this is not always easy: the transportation of the sterilized nutritive mediums (bouillons and gelatin), vessels for dilution, aseptic pipes, apparatus for heating, etc., presents some difficulties which I have tried to surmount, as may be seen below, by having a portable case made by M. Alvergniat for the biological analysis of waters. In certain cases—for example, when it is a question of estimating the quantity of germs in a water very remote from the bacteriological laboratory—it is necessary to convey it a greater or lesser distance by carriage or railway; care must then be exercised to preserve those qualities of the waters which they possess at the moment of collection.

The precautions indicated above, will shield the water from contaminations resulting from the more crude operations; as for others, it is essential to prevent much increase of temperature, and even to cool them considerably when there are journeys of some length. If this precaution be neglected, it will be the cause of most serious error, which may falsify the quantitative estimation of the bacteria.

As early as 1879, in publishing my first essays upon the enumeration of microbes contained in telluric and meteoric waters, I spoke of this insidious cause of error in these terms:

"These are the numbers found in the analyzed waters immediately after their arrival at the laboratory; if there is a delay of twenty-four hours, the bacteria multiply in such a manner that these numbers are no longer recognizable."

Those experimenters who have not taken this recommendation into account have been taught its justice and the ne-

cessity of analyzing the water very soon after its collection, or, if that be impossible, to transport the water at a low temperature so as to keep the growth and development of the bacteria in abeyance. Some examples will impress the reader with the absolute necessity of this.

Experiment.—During the summer a 200 c.c. bottleful of the water of the Dhuis was transferred directly by carriage from the aqueduct of Ménilmontant to the barracks of Loban; the journey was accomplished in thirty minutes. The temperature of the water of the aqueduct was 13.2° C. This specimen was subjected to the three following analyses:

	Temperature.	Bacteria to the Cubic Centimetre.
At noon precisely, . . .	16.6° C.	57
At half-past one o'clock, .	19.5° C.	143
At three o'clock, . . .	20.9° C.	456

The temperature of the surrounding air remained at about 21.5° C.

In the space of three hours, and before the temperature of the water had attained even that of the air of the laboratory, the number of bacteria increased every hour following the terms of a geometric progression the ratio of which was 2.

Let us next consider the disturbances which may be introduced into the micrographic analysis of waters which have been kept for a still longer period:

Experiment.—A bottle of water from the Vanne, taken at the receiving tank of the reservoir of Montrouge, when analyzed immediately, gave the following result: Temperature, 17° C.; bacteria to the cubic centimetre, 56.

The next day, exactly twenty-four hours after, the temperature of the water being 21.2° C., it contained 32,140 bacteria to the cubic centimetre.

If the analysis of spring waters be deferred for several days, the changes become so great that it becomes impossible to speak with certainty about the source of the specimen of water under consideration.

Experiment.—A recent specimen of water from the Vanne, taken from the receiving tank at the reservoir of Montrouge, shows upon reaching me, a temperature of about 16° (15.9° C.); subsequently it showed the following results:

	Temperature.	Bacteria to the Cubic Centimetre.
Immediately,	15.9° C.	48
Two hours after,	20.6° C.	125
One day "	21.0° C.	38,000
Two days "	20.5° C.	125,000
Three days "	22.3° C.	590,000

Thus, during the first hours, the experimenter will report a wealth of microbes in the water of the Vanne, about equal to that of spring water. At the end of twenty-four hours, judging only from numerical results, one might imagine that he were examining the Seine water taken between the bridges of Austerlitz and Alma; two days later, Seine water taken above the sewer at Clichy; three days after, Seine water drawn below this same sewer—that is, contaminated by sewer water.

Moreover, if we examine the transparency of the water in which so great a number of bacteria multiply with such rapidity, there is nothing to show the degree of infection which it attains; the clearness of a water is not a characteristic of any value in micrographic examinations.

Experiment.—December 30th, 1886, a bottle of water from the Vanne, after having been subjected to immediate enumeration, is placed in a stove at the steady temperature of 30° C.

	Bacteria to the Cubic Centimetre.
Immediate analysis, Dec. 30th, 1886,	71
Analysis made Dec. 31st, 1886,	71,000
" " Jan. 3d, 1887,	1,070,000

This phenomenon of the rapid increase of bacteria in spring waters is not peculiar to the waters of Paris; all very pure spring waters are the seat of similar changes, of prompt and characteristic auto-infection.

Experiment.—A specimen of water from the springs of St.-Laurent, four or five miles from Havre (lower Seine), arriving surrounded by ice, showed—

	Bacteria to the Cubic Centimetre.
Immediately, Sept. 20th, 1887,	7
Analyzed Sept 21st, 1887,	3,200
Analyzed Sept. 26th, 1887,	800,000

From this date the number of micro-organisms diffused in this water slowly decreased; at the beginning of the year 1888 there were less than 100,000 bacteria to the cubic centimetre.

These examples suffice to show that it is impossible, without influencing the analytical results, to allow the temperature of the water to rise above that which it had when collected.

Would it be possible to preserve the exact microscopic composition of the water by keeping it at the temperature which it possessed either on emerging from the soil, or in the pipes where it circulates with more or less rapidity under constantly variable pressure? Experience again answers in the negative.

From the time that the ordinary conditions of a water are changed, the number of its bacteria increases; consequently the bacterial changes observed are not due solely to the increase of temperature.

Experiment.—A bottle of water from the Dhuis, containing, when taken, ninety-five microbes to the cubic centimetre, is kept during forty-eight hours at a temperature between 14.7° C. and 15° C., only 2° C. above the natural temperature of this water circulating in the aqueduct of Ménilmontant. After forty-eight hours, a second estimation shows 119,000 bacteria to the cubic centimetre.

Experiment.—A specimen of water from the Vanne (temperature 12° C.), containing forty-eight bacteria to the cubic centimetre ten minutes after taking it from the receiving tank at the reservoir of Montrouge, is left for twenty-six hours in a temperature between 14.8° C. and 15.2° C.; at the end of this time it contains 25,000 microbes to the cubic centimetre.

If a degree of heat slightly above the proper temperature of the water is incapable of preventing the multiplication of these microbes held in suspension, it is interesting to know whether a temperature exactly like that which it possessed will prevent these changes so annoying to the analyst.

Experiment.—Water from the Vanne shows at the moment of its collection a temperature of 12.3° C., and contains 360 bacteria to the cubic centimetre; it is left for forty-eight hours between 12.1° C. and 12.3° C. At the end of two days it contained 17,800 microbes to the cubic centimetre.

Finally I have sought to discover whether a temperature

lower than the normal temperature of the various waters distributed at Paris is capable of preventing the increase of bacteria mentioned. Here, too, it is proven that while the increase may be somewhat less marked, still it certainly takes place with great rapidity.

Experiment.—A specimen of water from the Dhuis, taken at the aqueduct of Ménilmontant, containing 214 bacteria to the cubic centimetre, is left for two days at 9.5° C.; that is, at a temperature nearly 3° C. lower than that which it possessed at the moment of collection. After forty-eight hours this water contained 1,070 bacteria to the cubic centimetre.

Experiment.—Water from the Vanne, containing originally 170 bacteria to the cubic centimetre at a temperature of 11.5° C., left for three days between 9° and 10° C., showed 8,570 bacteria to the cubic centimetre.

But before discussing efficacious methods of refrigeration, I must describe the means of taking the temperature of the water without altering its micrographic composition, and the manner of maintaining it at a temperature included between that of the surrounding air and 0° C.

The sterilization of thermometers may be effected by rapid scorching; but when they are sensitive and their scale does not go beyond 50° to 60°, which is the case with exact instruments intended to measure low temperatures with precision, these scorchings are very imprudent; it is better to accomplish the sterilization by means of moist air.

For this purpose the thermometers are plunged for an instant into fuming nitric acid, then into a bottle containing ammoniacal air, and finally passed through three vessels of sterilized water at a temperature of 110° C. I have never seen a thermometric tube intentionally infested with spores of very refractory bacilli resist this treatment; and the limpid bouillons into which these tubes have been plunged have never shown the slightest alteration.

Aside from the refrigerator, which will be described later, to maintain water at a temperature varying from 4° C. to the temperature of the surrounding air, I use an apparatus formed of two leaden coils which I have not had occasion to mention; the first is immersed, according to necessity, in a warm bath or a cooling mixture; the second is placed in a cylindrical box very carefully wrapped with felt, in order to avoid, as fully

as possible, all loss of heat or cold. To the centre of this second coil the bottle of water, whose temperature is to be kept at a given degree, is attached.

If, for example, we desire to preserve a specimen of water at 13° C. in the Parisian laboratories, it will suffice, without any other precaution, to allow the water from the city pipes to flow through the coil which surrounds the bottle of water; this will preserve this temperature with sufficient accuracy.

If one desires to obtain a degree of heat above 13° C., and lower than the degree of atmospheric heat which, in summer, may rise to 28° C. and 30° C., we prepare a bath of water at about 40° C. to 50° C.; the first coil is then plunged into this bath and the flow of the city water arranged so that the water reaching the second coil, which surrounds the bottle, has acquired the degree of heat desired.

The repeated trials which this operation necessitates do not take long; they require only a few minutes when we make use of a reservoir of water at a constant level, producing a uniform flow, and when we are careful to measure the temperature of the water at the outlet of the coil which encircles the bottle of water.

For temperatures as low as 13° C. down to 4° C., the warm bath which holds the first coil is replaced by cold water in which blocks of ice should constantly be kept floating, so that the coil will be immersed in water at 4°. Then it will be sufficient to regulate the rapidity of the flow of the city water so that its temperature shall fall to 5° C. or 6° C.

When, in bacteriological studies, we wish to keep the temperature at 4° C., all apparatus can be done away with; the vessel, well corked and surrounded by a thin sheet of gutta-percha or rubber, is plunged in a receptacle full of water in which ice is constantly floating. If the temperature of 0° C. is absolutely necessary, every one knows that melting ice must be employed; then it will be indispensable to arrange that the water produced by the melting ice is drawn off as soon as it is formed.

For the general study of microbes in water, these various proceedings cannot be ignored, especially when refrigerators are not obtainable. The apparatus composed of the two coils is so simple that every experimenter can construct it for himself: two little leaden tubes are coiled around narrow, strong

screws or a strong cylinder of the required size; there is no need of skilled hands, for this apparatus, I repeat, is neither bulky nor difficult to construct.

When immediate analysis is impossible, the water must be brought down to a much lower temperature than its own without delay; as we shall see, the cold produced by melting ice gives sufficiently satisfactory results.

It is shown, from what has been said, that, in proportion as the cold increases, the multiplication of bacteria becomes more difficult, and that at a certain degree it should cease entirely; from this it would appear that it is possible to preserve the micrographic composition at exactly that existing at the moment of drawing. Unfortunately this is not so, for various reasons; first because while various adult bacteria die at 0° C., others among them increase at this low temperature. It is the same with low as with high temperatures: bacteria are found that die at 45° C., and others that live in as high a temperature as 70° C.; there is no absolute certainty in this matter, and it has often been affirmed that many microbes may be developed at — 10° C., which would not surprise me.

Cold, as I have proved as early as 1882 in blocks of ice from Lake Jonx a year old, is not very pernicious ordinarily for the majority of microbes; MM. Raoul Pictet and Yung, of Geneva, were able to subject an entire series of common organisms, with which I furnished them, to a temperature lower than 100° below zero for thirty-six hours, without destroying them. But waters cannot be compared with cultures where the same species exist by the million with every degree of resistance; so it would not be a matter of surprise if prolonged cold should prove destructive to some microphytes.

Meanwhile, let us take for granted the fact that a temperature of 0° C. seems to act as a reliable anæsthetic in this sense, that in ordinary water subjected to this degree of cold the number of microbes does not sensibly increase during periods of sufficiently lengthy duration.

Experiments.—Water from the Vanne, containing twenty-eight bacteria to the cubic centimetre, was kept at an average temperature of 3.3° C. (lowest 1.7° C., highest 4.9° C.) for twenty-six hours. At the end of this time analysis disclosed in this chilled water thirty microbes to the cubic centimetre; this proved that the organisms of the water of the Vanne had neither diminished nor sensibly increased.

2d. Water from St.-Laurent (lower Seine), drawn at a street well in the vicinity of the Hôtel de Ville du Havre, showed, on its arrival, September 17th, 1887, eight bacteria to the cubic centimetre; forty-eight hours after, September 19, seven bacteria.

3d. Another analysis of the water of Saint-Laurent, taken at a street well in the vicinity of the baths of Frascati: immediate analysis, September 27th, showed six bacteria to the cubic centimetre; the water plunged in a mixture of melting ice showed, September 28th, twenty-four hours later, 7.5 bacteria to the cubic centimetre.

4th. Another analysis, this time of spring water gathered at Saint-Laurent, furnished 7.5 babcteria to the cubic centimetre, and one day later, October 1st, 8.3 bacteria to the cubic centimetre.

5th. A specimen of water from the sand pits of the Loire, in experiments of Engineer in Chief Lefort, arrived in ice, showing fifty bacteria to the cubic centimetre; two days later the same specimen, kept at 0° C., showed ninety bacteria to the cubic centimetre.

The refrigerating power of melting ice seems, then, to furnish the means to this desired end; that is, to prevent on the one hand the increase of bacteria in water, and on the other their diminution.

I have tried to preserve a steady micrographic composition without resorting to cold, by means of sulphuric ether, chloroform, and various ethers of the fatty series, but without satisfactory results. Generally, the number of microbes diminishes with great rapidity, only to increase as rapidly when the water ceases to be under the influence of the anæsthetic. Perhaps by constant research this problem, the solution of which now appears to me very difficult and even impossible, may be solved.

In fact, those who have closely studied the delicate organisms called bacteria know that these beings have an ephemeral existence; that is, of very limited duration. When they are unable to multiply, at the end of a certain time varying from some hours to some days, they disappear completely.

Here is a striking example:

Experiment.—Twenty c.c. of water micrographically sterile (I refer to water distilled at from 30° C. to 35° C. in an apparatus entirely of glass, sheltered from all impurities of or-

ganic origin, atmospheric or otherwise, consequently deprived of the nutritive elements habitually diffused in ordinary distilled waters) received an addition of two drops of Vanne water in full bacterian activity.

	Bacteria to the Cubic Centimetre.
1st enumeration, immediate, showed, .	128
2d " 24 hours after, showed, .	75
3d " 4 days " " .	8.3

Seven days later four grams of this water did not contain a trace of organisms; at the end of a week there remained, then, less than five of the 2,560 bacteria which had originally been present.

It is therefore quite positive that, when the bacteria are rendered motionless through cold or through other agents incapable of exercising a harmful effect upon them, they die for the sole reason that their term of life is very short. Based upon this fact one ought, it appears to me, banish from the mind all hope of preserving, for any length of time, a fixed number of bacteria in drawn water.

If, we notice, in the experiments reported by me, waters of the Vanne, of Saint-Laurent, and of the Loire preserve a tolerably invariable number of microbes, it is because, by the side of the microbes which die, there are others which multiply; and in this manner a sort of equilibrium is established between the number of deaths and births, producing the illusion of invariability in the number of germs particular to each species.

Experiment.—Water from the meadows of the city of Toulouse is preserved during four days in melting ice. Every twenty-four hours this water, which shows with sufficient accuracy the same average number of bacteria (650 to 776), is subjected to a comparative quantitative analysis with a live bacterium of a violet color and with a bacillus with a red spot; these two species rapidly liquefy the gelatin. Here are the results of this quantitative analysis:

	Colonies to the Cubic Centimetre.	
	The Violet Bacterium.	The Red Bacterium.
At the immediate analysis, . .	29	3
24 hours after, ...	9	16
48 " "	2	30
72 " "	2	40

The violet bacillus is shown in this experiment to possess little resistance against a temperature of 0° C., while the red bacillus is still able to multiply promptly enough in this temperature.

The fact which I have mentioned is observed very frequently. It is worthy of very serious consideration, especially when it becomes a question of declaring whether a water is or is not pathogenic; it may be so at the moment of its collection, and may not be so any longer after a period of twenty-four hours in ice.

There is scarcely any need of reminding the reader by more than a mention, of the interesting researches of Dr. Justyn Karlinski, of D'Emmerich and Pinto, upon the manner of action of the typhus bacillus in different waters; particularly the celebrated experiment of these last men of science, by which they demonstrated that a well, intentionally polluted with 200,000 typhus bacilli to the cubic centimetre, was found absolutely pure at the end of seventy-two hours. Dr. Karlinski, in his analyses of canal water and stagnant water kept at a temperature a little below 8° C., did not find a single typhus bacillus at the end of twenty-four hours, although both of the waters had been charged with several tens of thousands of the bacilli of Eberth the day before.

In the face of all these considerations, it appears clear that with relation to the presence of these and those bacteria in water which has been left a day in ice, the affirmations of bacteriologists are only of value when they are positive; in negative cases, I cannot be too strong in recommending prudence and reservation.

It remains for me to add that cold at 0° C. does not exercise absolute anæsthetic power upon the bacteria contained in certain waters, especially those strongly charged with organic substances or mineral salts, which act as a medium of culture; in this class I consider sewer water, privy water, sea water, etc. Among the researches which I have made in this direction I will quote only one experiment:

Experiment.—A specimen of sea water, taken at random several miles from Havre, reached me in ice November 17th, 1887; it contained at the immediate analysis 150 bacteria to the cubic centimetre. This specimen kept constantly at 0° C. showed, twenty-four hours after, 520 bacteria to the cubic

centimetre. November 21st, that is four days later, the number of bacteria had increased to 1,750 to the cubic centimetre.

The same sea water left twenty-four hours at an average temperature of 20° C. showed fabulous numbers of bacteria—many millions to the cubic centimetre.

These facts being established, I will be much more brief in my description of practical means by which water may be conveyed at a temperature approaching that of melting ice.

For this purpose I employ the chest represented by Fig. 3, when the specimens are to be transported by rail.

The specimen of water furnished by the correspondent is put in the bottle F, with proper precautions, corked, and sealed up with sealing-wax; it is then wrapped in paper and placed with slight friction in a metallic cylindrical box, where it re-

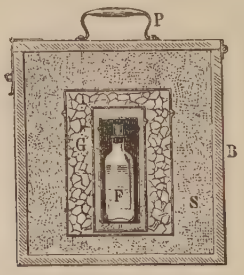

Fig. 3.—Refrigerator for Long Voyages.

mains during the voyage, sheltered from all shaking, consequently from all blows which might break it.

This first box is placed in a second, larger in all its dimensions by some centimetres, and the empty space is filled with sawdust. This system, well closed, is then placed in a much larger metallic box, which is filled with ice broken into large pieces. In summer, for journeys that last thirty-six hours (as I have assured myself by sending from those parts of France most remote from Paris), it requires six to nine pounds of ice.

Finally, this third and last box, very firmly closed, is buried in sawdust in a wooden chest, B, furnished with a hinged top and a handle, P. The agent then delivers it without any delay to the messengers, with orders to have it reach its destination as quickly as possible.

As a precautionary measure, the box should be sealed at its departure, and reach the analyst with the seals intact.

If the water is to be conveyed for some hours only, one may make use of a little portable chest lined with zinc, filled with ice, in the midst of which the bottle, protected by its double envelope, is placed.

I have received from some correspondents other systems of iceboxes, from among which I will mention one which permits the simultaneous transportation of several specimens of water.

In a zinc box, square or circular, are introduced, carefully lowered upon wooden supports, the bottles or the flasks containing the water. This box is placed in the centre of a wooden chest and surrounded by a mixture of ice and sawdust; finally, this chest is again placed in the middle of a second and much larger one and again covered on all sides with a thick bed of sawdust; then the whole is solidly nailed up. The ice melts slowly in the sawdust, and the cold produced is very great. The temperature of the air found in the central box containing the specimens always remains below 4° C. In the ice-chests which I have constructed, the temperature may descend to 0° C.; but from the time that the quantity of melted water becomes considerable, the temperature slowly ascends and may reach 4° C. when the ice is almost completely melted.

It is evident, then, that the various apparatuses are somewhat imperfect, and that we should consider it fortunate when the water chilled at its departure arrives at a temperature below 5° C.

In conclusion I will repeat what I stated at the beginning of this chapter: whenever it is possible the micrographical analysis of water should be accomplished upon the very spot where it is found.

CHAPTER III.

QUANTITATIVE ANALYSIS.

I. General Remarks upon the Processes.

In physical and natural sciences, exactitude of the means of investigation is of the highest importance; for the more perfect the methods employed, the more quickly are discovered the laws which govern the phenomena to be investigated.. In general we should mistrust expeditious and too easy methods, which often carry with them numerous causes of errors capable of altering the accuracy of the results, or of giving only approximations with which a conscientious experimenter should not content himself.

On the other hand, long and complicated processes, which require assistants, expensive materials, laboratories well furnished with apparatus, are greatly faulty by placing such special researches into the hands of a too limited number of observers and of resisting popularization for a long time. Of these difficult methods of application I will not speak at length in this study; I wish, above all, to be simple, and to describe methods of operation which can be used by mere novices in bacteriology.

Moreover, by so doing, I will harm no one; for the author himself is the promoter of processes of enumeration of bacteria which are considered full of difficulties. I will not deny that the enumeration of bacteria by cultivation in bouillon requires very extensive facilities, much patience, and a considerable quantity of materials—precisely the three things in which beginners are ordinarily lacking. Nevertheless I must assert that analyses based upon the cultivation in liquids present numerous qualities which outweigh in precision and exactness the so-called plate method, and that finally my process has the merit of being generally applicable.

Briefly, it consists in diluting the water to be analyzed in such a manner that, in one hundred specimens of bouillon to

which the specimen has been added, twenty or twenty-five at the most may be altered by the bacteria. If one possessed in advance sufficiently exact ideas concerning the number of microbes in the water, this process could easily be applied; but most often we do not possess such knowledge, and then it is necessary to resort to numerous preliminary analyses or to decide upon several series of estimations with dilutions of various and graduated powers.

This is the only defect of fractional analyses, if such a difficulty can be called a defect.

But does any one believe that it is sufficient to use the plates of gelatin, in order to dispense with the necessity of dilutions and fractional cultivations? This idea would be absolutely erroneous, and the experimenter who prides himself upon never resorting to dilutions, shows that he is very ignorant of the requirements of an analyst.

Let us take an example: Here is water recently drawn from the Vanne; let us prepare a plate with a drop of this water; suppose that the number of bacteria in this spring water at the moment of drawing be equal to 400 to the cubic centimetre, and that twenty-five drops fallen from the pipette weigh one gram, the plate furnishing sixteen colonies. Let us wait until the same liquid has changed after some days, in the vessels in which it was gathered; then let us prepare a new plate under the same conditions, and we shall see it charged with 2,500 and sometimes even a larger number of colonies. With a drop of sewer water, the number of colonies may vary from 25,000 to 250,000 to the plate.

It is clear therefore, that on account of the impossibility of conveniently counting so great a number of spots and points in a necessarily restricted space, previous dilution of the water is essential, whatever may be the process chosen for the bacteriological analysis.

I have just mentioned the fact that plates furnish 2,500, 25,000, or 250,000 colonies, from 1,000 colonies distributed upon 0.1 mq. of surface; the enumeration of bacterian islets becomes laborious, difficult, and inaccurate, even with the aid of ruled plate, especially if the bed of gelatin is of any thickness. The colonies which are displaced by the change of direction of the visual rays may be counted twice or not at all. But that is the least defect.

There is, in addition, a strong objection, which I entered long ago, to the exclusive uses of plates of gelatin, and to which there has not as yet been a satisfactory response.

Experience shows that the microscopic organisms of water are more readily revived than the dried germs drifting through the atmosphere, but that nevertheless they require fifteen days of incubation in the gelatin, exposed to 20–22° C., in order to appear in a clearly visible manner as habitual forms of colonies. On the other hand, it is established that an average of twenty bacteria from water, spread upon a plate of one square decimetre (after deducting for mould, the destructive and liquefying power of which is very considerable), fluidify the nutritive substratum, partially or totally, before the end of the second week. In inoculating more than twenty bacteria, therefore, upon a plate of gelatin of a given surface, we generally find it absolutely necessary to enumerate the microbes, often definitely, before a certain number of bacteria have had time to become visible—that is, numerable.

Time of incubation of bacteria of water, inoculated in plates of gelatin kept at 20° to 22° C.:

	Proportion for 1,000 Colonies Appearing from 1st to the 15th Day.
After 24 hours,	20
" 2 days,	116
" 3 "	118
" 4 "	133
" 5 "	143
" 6 "	107
" 7 "	88
" 8 "	55
" 9 "	41
" 10 "	38
" 11 "	33
" 12 "	29
" 13 "	30
" 14 "	25
" 15 "	24

In putting aside (voluntarily or because forced by unseasonable liquefactions) the plates of gelatin at the end of the first week, we fail to take account of a quarter of the colonies;

this is an error of twenty-five in the one hundred: hence it is necessary that the analyst be warned about this.

When, in place of twenty bacterian colonies, a plate shows 500, 1,000, or more, it is readily understood to what errors the experimenter is exposed. From my own analysis, a plate of one square decimetre of surface, which held 500 colonies direct from the water, is no longer appreciable after the fourth day; that is, the analyst can only take account of thirty-eight to thirty-nine in each one hundred of the living bacteria contained in the liquid under enumeration. One can conceive how much these premature readings are to be regretted, and how difficult it is to escape the conclusion that the factors resulting from this defective mode of experimenting are always too feeble, consequently inaccurate. It was in order to guard against this inconvenience that some attempts were made to curb the encroaching activity of certain microbes; but, to my knowledge, these laudable efforts have not been crowned with success.

The remedy for this is to inoculate the plates with the least possible number of germs; in other words, to attenuate and dilute the water to almost nothing, as is done in the method I have used for thirteen or fourteen years.

Contrary to the mode of proceeding of some of my rivals, before pronouncing upon the value of a method, it is my custom to study it for a long time (several years if necessary) and then to bring a respectable number of facts to the support of my assertions.

To sustain this theory of mine, I shall produce statistics gathered in 1889 and 1890, showing how many plates 20 cq. of surface, inoculated with one, two, three, four, and five colonies, have reached the fifteenth day without becoming the seat of liquefaction widespread enough to hinder quantitative enumeration.

Statistics.—13,954 plates, inclosed in conic flasks of 0.05 m. diameter at the base, were utilized from January, 1889, to October, 1890, for the microscopic analysis of water by the method which will be hereafter described under the title of "the mixed process."

Of this number, 820 showed mould associated or unassociated with the colonies of bacteria; I eliminate them because, of these 820 plates, 662 were liquefied before the fifteenth day;

and I wish to consider here only liquefactions produced by the bacteria.

There remained, then, 13,134 plates of gelatin, which gave the following results:

6,468 showed no colonies.
6,071 showed from one to five colonies.
595 showed six or more colonies.

As I desire to remain in the most unfavorable position toward the theory which I sustain, I again eliminate the 595 plates which exhibited more than five colonies, and twenty-six in the hundred of the cases of liquefaction before the fifteenth day.

There remained, then, 6,071 plates presenting one, two three, four, or five colonies, in the following proportions:

			Colonies.
3,005	plates	presenting, ...	1
1,407	"	"	2
930	"	"	3
422	"	"	4
307	"	"	5

1st. Of 3,005 plates presenting one colony, 194 (6.4 in the 100) were liquefied before the fifteenth day.

2d. Among 1,407 plates presenting two colonies, 135 (9.5 to the 100) were liquefied before the fifteenth day.

3d. Among 930 plates presenting three colonies, 121 (or 9.5 to the 100) were liquefied before the fifteenth day.

4th. Of 422 plates presenting four colonies, 67 (or 15.8 in the 100) were liquefied before the fifteenth day.

5th. Finally, of the 307 plates presenting five colonies, 53 (or 17.2 to the 100) were liquefied before the fifteenth day.

I think it unnecessary to repeat that inoculations which give upon each plate five or more colonies will show upon analysis at least twenty-six to the one hundred cases of liquefaction before the end of the fifteenth day—the length of time required for the hatching of the bacteria.

It follows, then, from the preceding statistics that we should reduce the number of bacteria intended for development upon plates of gelatin to one, two, or three colonies at the most for

each plate of 20 cq., or to five, ten, or fifteen if the plate is five times larger and presents one square decimetre of surface.

The negative results of each experiment should not occupy the attention of the observer who operates upon numbers of plates; too many colonies, on the other hand, will always show variations.

That is to say, it appears to me that we again fall into the method of fractional inoculation, with this difference: that the only advantage which the gelatin on plates presents is to surprise the operator when he finds that the number of bacteria is ten to fifteen times greater than that which he expected.

In order to obtain a satisfactory result with bouillon, the number of negative inoculations should vary from seventy-five to eighty-five to the one hundred; these limits are really a little too elastic, and force even the most experienced to practise several series of experiments; then he will be at liberty to choose those inoculations which present only twenty to the one hundred cases of alteration; this requires the use of several hundred specimens of bouillon and requires one or more assistants.

My method has evidently not found favor among the strong partisans of gelatin plates; but when it has been criticised in France and abroad, I always maintained that it has been imperfectly understood and badly applied, so that they have never been placed under the same conditions as when I use it myself. MM. Petri and Mead-Bolton, notably, who tried to prove it defective, were unsuccessful except in working outside of the boundaries within which the process of fractional inoculation gives positive results; on the contrary, every time they have experimented within this limit, the numbers which they have obtained have been better than those furnished by gelatin plates; and I may also add that they proved their experiments by means of a number of specimens of bouillon, which I would scarcely use for preliminary analyses.

Besides these causes of error which I mention, and which are surely produced when too many germs are planted upon the gelatin plates, there are others equally worthy of mention. One of them is the impossibility of raising the temperature of the plates above 23° or 24° C. without liquefying the substratum; there are, however, many organisms, some of great

importance, which are never sensibly developed at 22° to 24° C. Among them we may mention the bacillus of tuberculosis, of diphtheria, and many other ordinary kinds which are easily cultivated in bouillon heated to between 30°, 40°, and 60° C.

There also exist several classes of micro-organisms for which gelatin proves an unfruitful medium. We will mention incidentally some bacilli found in urine, several nitrifying organisms investigated by Winogradsky, who has established by this negative medium a very curious process of separating the ordinary microbes; this process consists in finding organized agents of nitrification precisely where the gelatin does not present even the smallest colony.

I must also warn the experimenter that the microphytic spots are not usually brought to a state of purity by the cultures. It is sufficient, in order to be convinced, to take these colonies, inoculate the bouillon, then to form plates with this bouillon. Most often heterogeneous colonies appear upon the jelly which the microscope, as well as culture and examination by biochemical processes, show, belong to entirely different organisms.

I can also mention other inconveniences due to the fact that gelatin softens so readily. These general liquefactions may be observed in the laboratories in summer when the temperature rises above 25° C., and cause a regular slaughter of plates if they are not placed in cellars or in ice-boxes sheltered from the heat of July and August. But it is not my intention to begin by discouraging the beginner. I prefer to say that the process devised by Dr. Robert Koch undoubtedly shows progress in the study of micro-organisms. This process was certainly not indispensable to the development which science owes to the memorable work of M. Pasteur; however, in facilitating the study of bacteria and gaining an access of a large number of students to micro-biology by the application of solid media, this German savant has given a rapid impetus to the knowledge which this science has acquired during the last few years.

II. Quantitative Analysis and the Apparatus Required.

As most natural waters contain a sufficiently large number of bacteria, varying in each case, the first difficulty of the analyst is to know in what proportion to plant the specimens

received, in order to obtain in the bouillon or upon the plates a convenient number of colonies; if the number be too small, the result may be considerably influenced by a chance inoculation; if too large, the preceding pages have shown what errors may be produced; the first problem to be solved is to know to what degree the dilution should be carried.

The very pure spring waters should contain from one to one hundred microbes to each cubic centimetre; spring water accidentally or periodically contaminated by earth washed into it by rain or by a strong current of water, is much more impure; the number of bacteria that it furnishes may vary from 100 to 1,000 and sometimes reaches several millions. The water of streams and rivers contains an amount of microbes which generally varies from 10,000 to 100,000. Sewer water contains a dozen millions of bacteria in the same volume; and slop water, dirty and fetid, stagnating in marshes, the liquid of stationary cess-pools, may show several hundred millions to the cubic centimetre.

The source of a water is a valuable fact to know, for the experimenter may thus avoid the expense of unnecessary analyses. But this indication often leads him astray; he who desires the bacteriological analysis of water sometimes thinks it his duty to leave the analyst in ignorance of the nature of the liquid furnished, in order undoubtedly that the results obtained shall not be influenced by preconceived ideas. Others believe, with justice, that preconceived ideas should yield to determined facts; it is for this reason that they place false labels upon the flasks, misrepresenting the proper conditions. Finally, there exists a last class of persons who amuse themselves by complicating the already sufficiently arduous work of the bacteriologist, by mixing clean and dirty water, in adding to magnificently pure spring water some drops of a putrefied liquid, with the evident intention of testing the sagacity of the operator, and perhaps also to laugh at his expense if he does not discover the fraud. The bacteriological processes are to-day, fortunately, sufficiently certain to reveal these frauds; even a micrographic novice could (all the more if the specimen came to him in good condition) believe in an error on his part by which an incomplete sterilization of the medium had been effected.

However, there occur cases relatively frequent, in which

the waters given for testing reveal nothing to the operator which can be of use as a guide to him; I allude to those which bear the label of well or cistern water. One well water will be as pure as spring water, while containing as many bacteria as the most impure water of the river or canal. In these doubtful cases one should not hesitate to proceed to a quadruple or quintuple analysis with dilutions varying from 1:1,000 to 1:100,000. The preliminary analyses may abridge this work, but they have the defect of delaying the analysis itself for at least twenty-four hours.

Dilution of the Water.—This is the name given to the operation designed to increase 1 c.c. of a given water to ten times, a hundred, a thousand times its volume, and by means of a special medium purged of germs by heat. This special liquid can be distilled water or ordinary water sterilized by the heat of 110° C. Ordinary water usually gives a tolerably abundant precipitate of carbonate of lime; this may be eliminated by boiling for a few minutes and then filtering.

In order to dilute water 1:10, it is necessary to add to 1 c.c. of the water 9 c.c. of sterilized water; in order to dilute it to 1:100, 99 c.c.; to 1:1,000, 999 c.c. of water freed from germs, etc.; but in order to dilute it 1:1,000,000, it would be necessary to add 1 c.c. of impregnated water to 100 litres of sterilized water; this operation would scarcely be practicable, and the difficulty is surmounted as follows:

The water is first diluted to 1:1,000; then of this water at 1:1,000, 1 c.c. is introduced in a second litre of sterilized water. Thus, in order to dilute water to 1:1,000,000, two litres of water only need be employed. Although these operations are very simple, they must be made with great care: the water to be analyzed must be so agitated as to distribute through it, in as homogeneous a manner as possible, the bacteria which the cold has precipitated to the bottom of the bottle, or those which, being deprived of locomotion, naturally remain on the inner surface of the vessels by reason of their superior density as compared to water. The second flask is, in its turn, shaken for a long time before we use the liquid contained in it, either for direct inoculation or for diluting to a second power.

If these directions be neglected, we obtain in the specimen of natural water too pure or too impure a liquid, according as the pipette is plunged less deeply or more deeply into the

water; the dilutions will present no homogeneity, and one may happen upon a current containing few or no germs; the theory of the dilution is to distribute as exactly as possible the same number of microbes in each cubic centimetre of the medium; I know that this rarely occurs in practice, and that with care we may obtain approximate results, sometimes identical with the double experiments made for this purpose.

In order to conveniently dilute the water, I employ bottles and flasks of a capacity varying from 20 c.c. to two litres; the necks of these bottles are furnished with round, movable caps (see Fig. 4); I prefer the flask M, whose shape renders it very firm, and whose very large body facilitates the shaking of the

Fig 4.—Bottles eor Cultures and Dilutions.

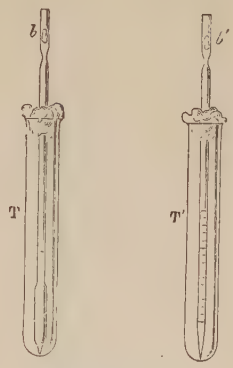

Fig. 5.—Pipettes Gauged and Graduated, Sterilized.

liquid and permits the dilution to be effected under excellent conditions. We may also make use of ordinary flat-bottomed bottles the necks of which are provided with a good wad of cotton batting; this must be removed when making the dilution, so as to admit the introduction of the little pipette containing the water to dilute with, and must be replaced immediately after, when it is to be shaken. It is advisable to have a series of such bottles of different sizes, containing a fixed quantity of sterilized water, ready for use. I will close these instructions with the advice to subdivide the specimens; to take away, for instance, a quarter of a cubic centimetre from 1 c.c. of the water to be analyzed; that is to say, to obtain on an average four specimens (instead of one) representing the exact composition of the liquid mass.

Pipettes for Inoculating.—In micro-biological analyses we may use pipettes of 1 c.c., 2 c.c., 3 c.c., 4 c.c., and 5 c.c. capacity, measured and graduated or not in fractions of a cubic centimetre, and in such a condition that these glass instruments may be accurately freed from germs. They may be sterilized by the flame, according to need; nevertheless it is infinitely more convenient and rapid to have in advance a certain quantity of these pipettes perfectly aseptic. Fig. 5 shows the manner in which I maintain these instruments sterilized at 200° C. for one hour. In order to keep them free from all outside contamination, they are contained in tubes closed by a tight wad of cotton. When we wish to use them, this wad is set on fire and the pipette is withdrawn from its protecting sheath, free from all impurity. All these little instruments are narrow at their upper end, and furnished with a wad (b, b') of spun glass, in order to keep out dust from the fingers and surrounding air.

For subdividing natural or diluted water drop by drop, the graduated pipettes cannot be highly recommended, as this operation requires previous handling during which several drops usually escape from the apparatus; for my part, I prefer to use uniform pipettes made of a simple tube of glass tapered off, whose capillary opening permits an escape of nearly twenty-five drops to the gram. Every one can make these little instruments for himself, rejecting all those which give less than 240 and more than 260 drops of distilled water for ten grains. These pipettes are likewise provided with a wad of spun glass at the narrow upper opening; they may be sterilized collectively, to the number of 100 or 200, by plunging them point downward in a strong bed of spun glass contained in a suitable vessel; at the moment of using them, they are rapidly passed through the flame so as to burn the germs which may have deposited themselves on their outer surface.

Vessels for Culture.—For holding the bouillons destined for the inoculation and culture of schizomycetes, I know from actual practice only the flasks of Freudenreich (see Fig. 4, the bottles F, F′, F″; and Fig. 6), which are a happy modification of Pasteur's flasks; they consist of bottles of all sizes, provided with movable tubular caps or stoppers. For the same purpose, test-tubes—little tubes with cotton-wool wads at the neck—have been recommended. Most of these vessels are too

unstable, and the removal of the wads is a minute operation which involves numerous chances of infection, whatever the precautions may be with which we surround them.

The first expense of the Freudenreich bottles is quite high; most of the makers charge eighty francs per hundred; this price is excessive, and might be lowered to one-half if the orders were numerous enough to excite competition.

In the preparation of plates, the boxes of Petri, in very general use in bacteriological laboratories, often serve the purpose; but I have not thought it proper to adopt them in my researches. I find fault with them first for presenting too large a surface and insufficiently aseptic fastening; by diminishing the diameter of these boxes encased one within the other, we might, it is true, remove the first objection; but the second still exists. However rapid the removal of the microbes developed in these boxes, it is rare that the organisms

Fig. 6.—The Freudenreich Flask.

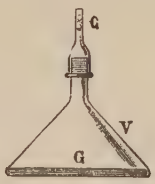

Fig. 7.—Conical Flask for Culture in Plates.

of the air do not deposit themselves upon the surface of these plates; hence they ought to be discarded after having been opened several times.

If many colonies are sown upon these beds of gelatin, as is done in these analyses (which I condemn when used quantitatively) the methodical examination of the colonies is not possible in consequence of the time that these observations occupy and the great number of openings and closures which microscopic preparations require. These openings should be very rare, and made so as to preserve the surface of the gelatin from the dusts of the air; consequently the apparatus of Petri does not conform to these legitimate requirements.

For the boxes of Petri, which I have mentioned as inconvenient, we may substitute conical flasks with movable tubular stoppers (see Fig. 7); these are much easier to use; for my analyses, I have them made in several diametres: 0.03 m. to 0.12 m., at the base. I advise procuring them of a

diameter varying from 0.05 m. to 0.06 m., as they then are most adapted to the necessities of the operator. When the diameter of the base is too large, the management of the colonies under the microscope is too laborious; while with flasks of 0.05 m. to 0.06 m. at the base, it is easy to take away with a wire of platinum, rectilinear or slightly curved (if the colony is placed at the periphery), the quantity of culture necessary for examination or inoculation.

The narrowness of the neck of flasks is generally a guaranty against infection from outside if we are careful to turn the vessel upside down or to incline it laterally. If the plate of jelly be invaded by a liquefying colony, this manœuvre is evidently no longer possible; but then we can imagine that, through an opening of a square half-centimetre, two hundred times less germs will fall than through an opening of one hundred square centimetres, which is the case with the boxes of Petri.

In order to avoid the inconveniences which these last apparatuses present, Esmarch has advocated plates rolled in tubes; these are obtained by introducing into a sterilized test-tube the still liquid mixture of water (for analysis) and gelatin, and revolving this tube in a vessel of cold water until the jelly is completely formed. This process is without doubt simple and ingenious; but the "fishing" for the colonies with the platinum wire, if one may employ this expression, is very difficult and often impossible, even for those whose eye and hand are not lacking in steadiness.

III. Nutritive Media.

Nothing can be more diverse than the nutritive media employed by bacteriologists for the culture of micro-organisms. In order to facilitate the study of these media we will divide them into two great classes: 1. Liquid media: 2. Solid media.

Liquid Media.

These liquid media may again be divided into: 1. Natural liquid media. 2. Artificial liquid media.

Then, forming a third subdivision, the natural and artificial liquid media can be sterilized at a low or at a high temperature.

Natural Liquids Sterilized by Cold.—In this group may be placed the fluids of animals and the juices of fruits and of vegetables. Among the animal liquids may be mentioned urine, the serum of blood, the serous liquids issuing from hydroceles, milk, the parotid saliva of animals, the aqueous humor of the eye, etc.

When we take sufficient antiseptic precautions—that is, when we remove these various liquids from the animal, and shelter them from atmospheric impurities as M. Pasteur was the first to do—they remain unaltered indefinitely and may be used immediately for the culture of various micro-organisms. But if the removal of these liquids has not been perfectly antiseptic, it is necessary before using them to rid them of contaminating germs.

Mr. Chamberland describes the manner of taking the blood contained in its blood-vessels, from the living or dead animal as follows:

Fig. 8.—Chamberland's Pipette.

"The process consists in passing the blood from the animal's body into a singed apparatus containing pure air, and then allowing it to remain in communication with the outer air. This result is very easily accomplished by the aid of glass tubes having the form indicated by Fig. 8. These tubes are heated in a gas furnace, after putting a stopper of cotton in at *a;* if we make use of a living animal, a vein or artery is laid bare, into which an incision is made, and the pointed end, which has been cut off and passed through the flame, is introduced. The blood flows of itself; the flow may be facilitated by aspirating through the tube *a;* the pointed end is then closed by a lamp.

"In preparing a dead animal, we take the heart of an animal just killed—at a slaughter-house, for instance; pierce its wall by the aid of a scorched scalpel, and plunge into it the pointed end previously cut off and scorched. We aspirate through the tube *a*, etc."

It is often easier, when the liquid can be readily filtered, to purge it of all organsims, by passing it through solid substances whose pores are fine enough to prevent the passage of bacteria. For this purpose M. Pasteur first employed gypsum; porcelain has been used with equal success by MM.

Gautier and Chamberland. For my part, I have shown, long before Dr. Hesse, that asbestos in rolls of filter paper answers the same purpose in sterilizing liquids ("Les Organismes Vivants de l'Atmosphère," 1883, p. 162).

Fig. 9 represents the apparatus which served for my first attempt at filtration through gypsum. It is composed of a flask with a long and slightly conical neck narrowed below its third part (see A). Below the narrow part, the capillary point *p* is passed through the lamp; above this same narrow part is placed a wad of asbestos of convenient firmness, *a*, upon which is placed a layer of wet plaster *t*, 7 cm. to 8 cm. thick. The formula for the latter is the following:

Water, ...	46
Plaster used for modelling, ...	51
Asbestos powdered, ...	3
Total, ...	100

The apparatus thus prepared is dried for one week or two, at a stove kept at 40° C., then the temperature is raised slowly to between 170° and 180° C. The object of this last heat is to destroy the germs diffused over the inner surface of the flask and those brought by the wad of asbestos, the plaster, and the water employed in wetting it, and also to bake the plaster; that is, to form anhydrous sulphate of calcium.

In order to start this sterilized filtering apparatus, we commence by soaking the plug of baked plaster-of-Paris with water; the plaster under the action of this liquid is hydrated with an escape of heat perceptible to the hand. This previous moistening has the advantage of making the adherence of the filter to the glass tube more perfect and of driving out the air from the pores of the plaster.

The filter properly soaked, the lateral point of the instrument is scorched, broken, and plunged in a flask of water sterilized at 110° C.; by expansion, 40 c.c. to 50 c.c. of air are expelled from the flask, which after chilling is replaced by an equal volume of microscopically pure water.

This water, brought to the boiling-point and rapidly vaporized, escapes from the lateral capillary point in the form of a continuous, hissing jet of steam; after some minutes, the greater part of the air in the flask is replaced by the steam;

now we need only seal the capillary point *p*, which is not difficult. The vapor in condensing produces a considerable vacuum; as a result, the juices or liquids to be sterilized are drawn into the tubular body of the apparatus and enter the flask *b* after passing through the plaster.

Fig. 9 represen s (A) an instrument in use; a large funnel *e* collects the liquid to be sterilized and leads it to the plaster filter. The same figure shows (B) a second system differing from the first in the addition of a refrigerator designed to prevent putrefaction in the liquids under experiment.

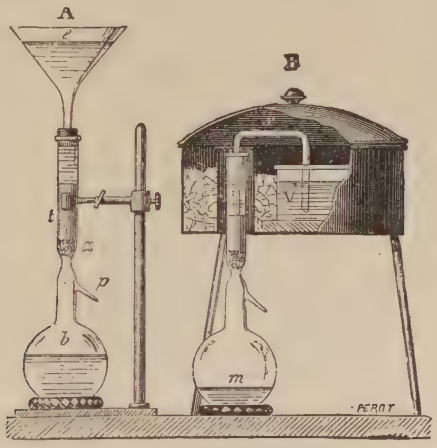

Fig. 9.—Plaster Filters.

For this apparatus, which has the defect of saturating the sulphate of lime with the liquid submitted to filtration, I have substituted another (see Fig. 10), formed of a strong vessel of silver-plated copper; it has a large neck furnished with a cylindrical plate of bronze, capable of holding, by means of eight screws, a cylindrical piece B, also silvered; the latter has at its lower end a ledge designed to support the metallic diaphragms and various stoppers, and lined by a paste of quicklime cemented to the wall of the cylinder by insoluble cement unalterable at 200° C. The upper part of this same cylinder may have a tray C provided with a tube designed to conduct the liquid to the filter. I have had made by Golaz, the maker of this apparatus, other cylinders provided with a thread on the inner surface, into which screws, with the aid of a strong key, a stopper of drilled bronze, which holds tightly the roll of

asbestos or of filtering paper or of other porous substances unalterable or scarcely affected by temperatures of 150° to 180° C.; the stopper then remains in place until the end of the filtration. Two faucets are placed on this bottle; one, R, high up upon the neck, is intended to control the vacuum in the vessel or to let the air escape; the other, below, R′, is intended for emptying the filtered liquid. The cylinder, provided with its very dry stopper, is fastened to the copper bottle, a washer of lead being placed between the surfaces, which would otherwise adhere; then the apparatus is heated for two hours

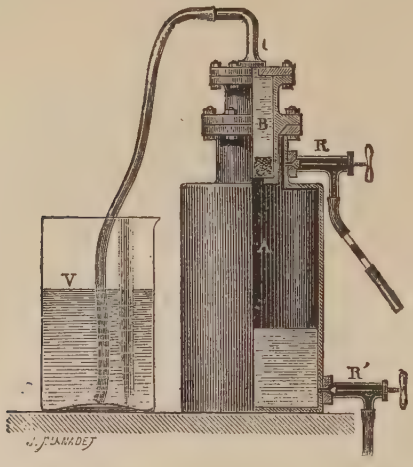

Fig. 10.—Filtering Apparatus for High Pressures.

either to about 180° C. or in the digester to 110° C. The vessel is then cooled; faucet R is furnished with an India-rubber tube containing a glass joint which holds a sterilized wad; it is placed in communication with any instrument which will produce a vacuum, while the liquid is drawn into the cylinder B by the pressure of the air or under higher pressure according to the nature of the filtering substance and of the liquid to be sterilized. The operation finished, the upper stopcock R is carefully opened; then, by means of a metallic tap screwed to stopcock R′ we distribute the filtered liquid intended for inoculation into sterilized flasks.

Porcelain filters are undoubtedly much preferable to the various apparatuses which I have just described; it is for this reason that I use only Chamberland's bougies in all my latest

analyses. This convenient instrument, like digestors, has had obstinate criticism; it has been accused of an incapability of filtering too thick substances and of allowing milk to pass with difficulty; this cannot be denied: paper itself, whose pores are much larger, filters neither mud nor thick jellies. But the mean side of the spirit of these opposers appears when they assert that the porcelain bougies cannot retain microbes

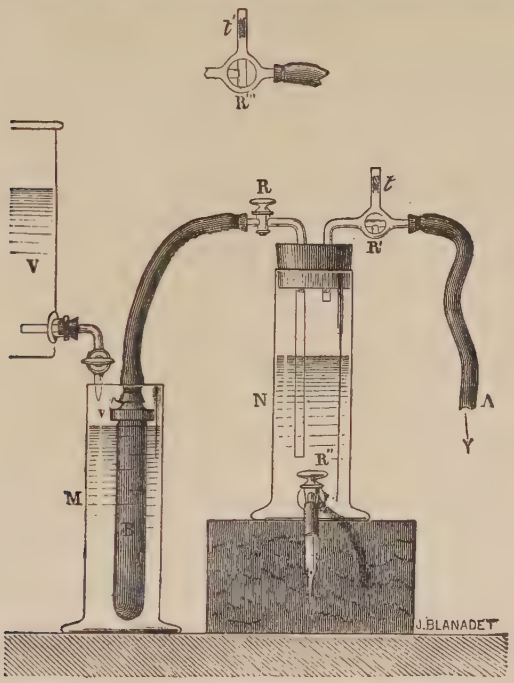

Fig. 11.—Filtering Apparatus Constructed with Chamberland's Bougie.

when they are cracked or when they present defects of continuity. I will not even name the author of this extraordinary discovery; I prefer to leave him in the glory of modestly triumphing over this incontestable fact.

For the filtration of liquids by Chamberland's bougie, I have adopted in my laboratory the arrangement reproduced in Fig. 11.

It is composed essentially of two tall beakers M and N; M receives the liquid to be filtered, N receives the filtered liquid; the stopcock R″, furnished with a glass point movable

by means of India rubber, serves to distribute the sterilized liquid, cold, into the vessels previously sterilized either by the digester at 110° C. or in the hot-air bath at 180° C.

When we wish to undertake the sterilization by filtration of an alterable liquid, we begin by placing the vessel N, united to the porcelain bougie B by means of an empty India-rubber tube, into the digester for one hour. After this is done and after chilling it, we fasten the tube which unites the bougie to the vessel with bands of India-rubber; then by the flow of the liquid in vessel V, governed by a stopcock, we fill the vessel M, at the same time aspirating energetically by means of the rubber tube A; the three-way cock R′ must occupy the position indicated in the figure.

Under the influence of atmospheric pressure, the liquid introduced into vessel M passes into the porcelain, is sterilized, and passes into vessel N, which it fills with more or less rapidity according to its nature; when this vessel is almost full, aspiration at A is suspended, stopcock R closed, and stopcock R′ is arranged as indicated at R‴; this causes a re-establishment of the atmospheric pressure in vessel N, for the outer air enters it after being filtered through the wad *t′*.

We then proceed to distribute the filtered liquid after having broken and scorched the movable glass point of stopcock R″. This operation effected, this point is again sealed, aspiration again established, and stopcock R″ arranged as shown in the figure; finally stopcock R is opened, renewing, of course, the flow of the liquid from vessel V, which had been suspended during the emptying of vessel N. The vessel refilled, it is emptied as before, and so on. The most delicate part of this operation is the construction of the instrument in such a manner as to prevent all leakage; if the rubbers are not bound with elastic threads, if the stopcocks R and R″ are not carefully greased with vaselin, as well as the large rubber stopper which closes vessel N and the stopper which opens stopcock R, air may penetrate through the least fissures and carry germs into the liquid filtered through the Chamberland bougie. The liquids which can easily be sterilized by means of the arrangement just indicated are: urine, diluted serum of blood, diluted albumen of egg, the lymphatic fluid, the serous liquids of hydroceles, etc.; also the juices of fruits of herbaceous plants (juice of apples, pears, grapes, liquids of cabbages, turnips,

carrots), which are readily obtained by cutting up the fruits and herbs, pounding them in a mortar, and straining under pressure in a strong linen bag. The liquids obtained are first strained through bolting-cloth, then filtered through paper, and finally drawn through the bougie.

I prepare the juice of meat by macerating it for one hour at 35° C., using equal parts of water and chopped meat; the mixture is pressed, the collected juice neutralized, then passed through fine bolting-cloth and subjected to filtration through porcelain; in this particular case, we must work rapidly or use refrigerating mixtures to keep the liquids intended to be sterlized at about 0° C., for it sometimes happens that at the end of some hours this juice exhibits signs of putrefaction.

When the liquid to be filtered through the Chamberland bougie is muddy or thick, the porcelain, which at first furnishes a considerable quantity of liquid with sufficient rapidity, is obstructed, and the liquid falls into the sterilizing receptacle only drop by drop. To remedy this, we cease aspiration, a second vessel full of clear water is substituted for M, and with the aid of a sponge or toothbrush the outer wall of the bougie is washed; then everything is put back in position, filtration begins again and goes on rapidly. I will not dwell upon the macerations which may be practised aseptically; there are processes which are much less accurate, and which will never enter into the practice of laboratories; I merely wish to mention them.

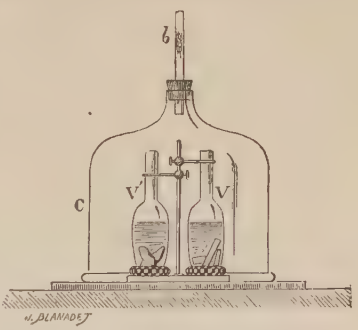

Fig. 12.—Apparatus for Preparing Sterilized Macerations.

To water freed from living organisms, we add either muscular flesh taken from a healthy animal a few minutes after its death, or fleshy parts of fruits, of green or tender vegetables (turnips, potatoes), which are obtained with the aid of heated cutters and whose contents are emptied by scorched shafts into the flasks or bottles of sterilized water; the latter can then be left open upon a glass plate covered with a bell-jar (see Fig. 12). These experiments are sometimes contradictory: the liquid in the vessels is muddy, and putrefaction

appears in the organic matter that has been macerated; but it is easy to recognize in most cases that this is due to the accidental inoculation of a microbe; with a little skill and care, we may obtain a really remarkable number of successes (ninety-five in one hundred).

For this purpose it is necessary to work in the open air after a rainy period, far from all habitation, and to avoid all operative defects which might favor the very germs which we wish to avoid. Mr. Chamberland was able to obtain pure infusions of fresh kidney beans taken directly from their green shells. Long before our experiments, M. Pasteur proved that the juice of grapes taken from their very interior does not contain a single living organism. Much more recently, in the "Annales de l'Institut Pasteur," M. Fernbach made the same experiments with a similar arrangement to that employed by me, and his conclusions are identical with those I published eight or ten years ago, either in the "Annuaires de Montsouris," or in my work upon the "Organismes Vivants de l'Atmosphère."

Natural Liquids Sterilized by Heat.—There is no advantage in sterilizing by heat the liquids secreted by animals or vegetables; for these liquids usually contain albuminous principles coagulable above 60° or 70° C., and hence possess a nutritive power which is lacking after they have been very much heated. Urine, of all the liquids secreted by the animal economy, is perhaps the one liable to least injury from boiling and from a temperature in the neighborhood of 110° C.

Artificial Nutritive Liquids Sterilized by Cold.—In this category of media may be classed bouillons or similar compositions containing volatile substances (carbonate of ammonia, alcohol, etc.) or decomposable by heat. The artificial media—which may be prepared by incorporating albuminoid liquids with water or bouillon, serum, lymph, or juices of vegetable origin—also belong to this category.

Artificial Nutritive Liquids Sterilized by Heat.—In bacteriological laboratories, a great variety of nutritive liquids is used; these may be divided as follows:

1st. Liquids called mineral.

2d. Bouillons prepared extemporaneously either with Liebig's extract of meat or with Cibil's extract.

3d. Bouillons of beef, veal, chicken, fish, etc., pure or with peptones.

4th. Bouillon of pure peptone.

5th. Decoctions of mushrooms (yeast, eatable mushrooms, mildew, mycelium).

6th. Finally, infusions of turnips, cabbage, grass, etc.

1st. The first liquids, called mineral, were prepared by Pasteur in order to show, contrary to the views of Liebig, that so-called alcoholic fermentation may take place in the absence of all plastic matter. By inoculating living globules of yeast in a liquid of the following composition:

	Parts.
Distilled water, ...	100.000
Candied sugar, ...	10.000
Ashes of a gram of yeast, . . .	0.075

M. Pasteur succeeded in obtaining alcohol in as considerable quantity as one could ask for. This experiment, so easy of reproduction, was a sad blow to the theories of fermentation universally held about 1860 by chemists of every nationality.

The solution of Pasteur, very appropriate for the nourishment of mildews and some bacterian species that are planted in it in an adult state, is less favorable to the revival of germs of the air or of water. Professor Cohn, of Breslau, subsequently modified this liquid by taking away the candied sugar evidently too favorable for the nutrition of mould fungi; his formula is:

	Parts.
Distilled water, ...	100
Tartrate of ammonium, ...	1
Ashes of yeast, ...	1

Later still this liquid was subjected to some happy modifications; phosphate and sulphate of magnesium were added, and its composition was thus fixed as follows:

	Parts.
Distilled water, ...	200.0
Tartrate of ammonium, ...	20.0
Phosphate of potassium, ...	20.0
Sulphate of magnesium, ...	10.0
Tribasic phosphate of calcium, . . .	0.1

Thus prepared, Cohn's liquid is not at all sensitive to the action of bacteria germs; yet exposed in places where dust

abounds, or when some drops of water are added, it becomes muddy and putrefies.

M. Rollin, Jaksch, and many other experimenters have recommended liquids of this nature appropriate for the development of one or several particular species; every one can imitate them, and thus it may be seen how many nutritive liquids can be formed from mineral and crystallized elements.

2d. For some time previous to the employment of decoctions of meats for the culture of bacteria, a bouillon was prepared in laboratories from Liebig's extract. The bouillon which I used for a long time in my experiments at the Observatory was prepared by dissolving in one litre of water fifty grams of meat extract commercially known as "extractum carnis Liebig"; when dissolved, it was neutralized by heat with soda. Brought to the boiling-point and filtered, this solution should have no effect upon color reagents. This bouillon sterilized at 110° C. furnishes a very light white deposit, insoluble in water, which the microscope shows is formed of a shining powder with irregular grains; these can easily be distinguished as living microbes and their spores. Under the action of light this liquid, of a fine red amber color after its preparation, changes color from day to day and acquires at length a very pale yellow tint. Thus obtained, the Liebig bouillon possesses at 18° C. a density of 1.024. The sterilized bouillon Liebig is about seven times less sensitive than the bouillons of peptonized beef. With Cibil's extract, analogous bouillons are prepared and used for the culture of certain bacteria which find in this kind of medium very abundant substantial nourishment; other microscopic species never grow in it.

3d. I prepare the bouillon of beef by making a decoction, for five hours, of one kilogramme of lean beef in four litres of water; the bouillon, skimmed from the time it begins to boil, is left standing after it is made; then the fat is taken out by filtration through a wet cloth; then it is neutralized by caustic soda. This done, it is boiled for ten minutes, filtered through paper, and its volume increased to four litres. The cloudy bouillons of meat, opalescent, slow to clarify, furnishing deposits even a month after manufacture, are always bouillons which have not been deprived of fat or insufficiently boiled after neutralization.

This decoction possesses at 20° C. a density of about 1.003; evaporated on the water-bath, it furnishes fifteen grams to the litre of a dry, brittle, perfectly soluble extract, not granular, but transparent like strongly colored gum arabic, of an agreeable taste, differing essentially from that anti-hygienic substance sold under the name of Liebig's extract of meat. By adding to the beef bouillon ten grams of sea salt, we obtain a salted bouillon remarkable for its sensibility to germs of the air and water; its density then becomes 1.009.

Bouillons are prepared in the same way with the muscular flesh of veal, of chicken, rabbit, fish, etc.; with the animal organs liver, spleen, pancreas, lungs, etc. These last bouillons are often very cloudy after their preparation, and filter with great difficulty; they may be made perfectly transparent by first carefully taking away the fat after complete cooling and then clarifying them by means of the albumen of egg, as will be shown some pages farther on in connection with the preparation of solid nutritive media.

4th. Mixed bouillons formed by the decoction of muscular flesh and peptone have also been substituted for pure beef bouillon; for my part, I do not see what advantage there can be in employing these mixtures. Bouillons of peptone are generally more sensitive with regard to bacteria than the decoctions of meat prepared with the precautions I have indicated; moreover, they have the advantage of being very easily prepared, and capable, so to speak, of a mathematical enumeration.

I wish to add here some *desiderata* relating to the adoption of the same nutritive media, in order that the analyses of different experimenters may be easily compared.

I will propose, for example, to give the bouillon used for quantitative analysis of water the following composition:

	Grams.
Peptone,	20.00
Sea salt,	5.00
Wood ashes,	0.10
Ordinary water,	1,000.00

The water is heated, the salt and peptone are dissolved, the wood ashes added, and the mixture is then brought to the boiling-point for some minutes. The water is slightly alkaline,

because the ashes and peptone commonly possess an alkaline reaction; then during ebullition we add some drops of a weak solution of tartaric acid, in order to render the liquid as neutral as possible. More concentrated bouillons of peptone have been recommended on the supposition that the alterability of these nutritive liquids depended upon the more or less intense disturbance which micro-organisms might produce in it; this conclusion is not supported by facts: the alterability of a bouillon is not in proportion to the quantity of nutritive substance added; on the contrary, beyond a certain limit, it becomes inversely proportionate to the weight of the peptone employed; for the peptone Chapoteaut which I use, this limit is about 30 to the 1,000.

Gelatin of a nutritive power nearly corresponding to that of bouillon presents the following composition:

	Grams.
Peptone, ...	20.00
Sea salt, ...	5.00
Ashes, ...	0.10
Gelatin, ...	100.00
Water, ...	1,000.00

5th. Acid or too alkaline gelatins are to be avoided, and especially the commercial gelatins, which have been antiseptic from the moment of their preparation, by unscrupulous makers, for the purpose of preventing their turning while drying. It will be well to employ gelatin Coignet No. 1, or the Nelson gelatins sold in threads.

Vegetable jellies, lichen and agar, are much less favorable for the revival of microbes; moreover, as ordinary gelose or agar dissolves only at high temperatures (65–75° C.), it is still very warm at the time when it is ready for the preparation of the plates; several delicate species already resist 40°–50° C. with difficulty.

The decoctions of mushrooms, of large mycelium, and notably yeast of beer have been prepared with a view to favoring the multiplication of some microphytes. These decoctions are often muddy and need clarification by means of the white of egg.

6th. Finally, even the bouillons of turnips, cabbage, hay, sweetened or unsweetened, have been utilized; that of hay,

which has enjoyed so great a reputation in England and Germany is the very worst to use: its degree of sensibility with regard to microbes places it among the so-called mineral liquids; while decoctions of cabbage leaves and turnips are more liable to putrefaction than bouillon Liebig.

Solid Media.

These media may also be divided—

1st. Into natural solid media.

2d. Into artificial solid media.

I will add to these subdivisions a third class of mixed solid media, prepared by mixing, with gelatin previously sterilized, animal or vegetable liquids sterilized by cold filtration.

Natural Solid Media.—In this category may be classed the pulp of fruits (oranges, lemons) utilized for the culture of mildew; the parenchyma of fleshy fruits—pears, apples, carrots, etc.; the potato, slices of which, cut by means of a sterilized knife, after the disinfection of the outer part by corrosive sublimate, have been employed for the culture of certain chromogenic and pathogenic species. Among animal liquids the serum of blood coagulated at about 70° C., by the process indicated by Dr. Koch, is employed for the culture of the bacillus of tuberculosis. Several operators have also made use of the albumen of egg coagulated at a low temperature, 50 to 55° C., etc.

Solid Artificial Media.—Of the solid formations used for the cultivation of schizomycetes we may employ:

1st. Nutritive gelatin.

2d. Peptonized gelatin.

3d. Jelly of lichen.

4th. Mucilages.

1st. Gelatin is almost universally employed for the preparation of solid culture media; its preparation presents no great difficulty; it is nevertheless necessary to attend to the different operations required to produce a condition of limpidity, in order to obtain it with the necessary qualities for bacteriological experiments. The clarification of this jelly by filtration through paper is tedious and troublesome; for that reason this mode of operating has been almost abandoned.

On the other hand, it is easy, by means of the albumen of egg, to obtain an absolutely clear jelly in regular condition

and at the first attempt, whatever may be the proportion of jelly used; this, however, rarely exceeds ten to one hundred.

In a capsule of copper, plated with pure tin, silvered, or, still better, of controxidized iron, we place 1,200 grams of ordinary water. This capsule is placed upon a furnace; twenty grams of peptone, five grams of salt, and a pinch of wood ashes are added. When the liquid has nearly reached the boiling-point, the capsule is withdrawn, one hundred grams of gelatin added without delay, and the solution of this substance is hastened by agitating with a spatula. If the gelatin is added to the liquid upon the furnace, one runs the risk of seeing the latter stick to the bottom of the capsule, and burn there under the direct action of the flame. This first part of the operation accomplished, we proceed to the clarification of the liquid as follows:

The capsule is replaced upon the furnace, whose flame has been considerably lowered, in order to bring the liquid slowly to the boiling-point. During this time we put the whites of two eggs together in a little porcelain receptacle with a handle; to this is added about equal weight of distilled water. This mixture is beaten for some time in order to hasten the solution of the albumen; then the albuminous water just prepared is allowed to fall drop by drop into the capsule placed upon the fire, taking care constantly to stir the solution of gelatin. This done, the liquid is left to itself until the clots of coagulated albumen form a whitish and foaming crust at the surface. The fire is put out when the first signs of ebullition appear. Then with a skimmer we remove the albumen from the surface of the liquid; the latter is passed through bolting-cloth which retains the clots diffused in the mass. From this bolting-cloth the liquid falls into a large glass funnel provided with a strong wad of absorbent cotton, which completes the clarification. This filtration should be effected when the liquid is very warm, and it is accomplished, even in winter, in less than a quarter of an hour. Then the perfectly clear gelatin is distributed into the vessels in which the cultures are to be made and these vessels and their contents are sterilized.

2d. Nutritive gelose is prepared like gelatin; there are some especial precautions which it is necessary to mention:

Gelose not having the tendency to stick to the bottom of the capsule, it may be dissolved in the water with the salt and

peptone. When the gelose is dissolved, which requires from a half to three-quarters of an hour, even when the proportion of this substance does not exceed twenty grams to the litre, we proceed to the clarification as with gelatin; but, in place of receiving the solution of gelose passed through the bolting-cloth in a funnel furnished with a wad of absorbent cotton, it is received upon ordinary filter paper, through which it runs very rapidly, giving a magnificently clear liquid. Freudenreich has advocated the filtration of solutions of gelose by the digester; this operation seems to me superfluous when it has been clarified with the white of egg as I have just mentioned; as with gelatin, the gelose is distributed into the vessels destined for culture; it is, however, necessary to hasten this work with this solution or else it will commence to solidify before this operation is completed.

The vessels containing gelose sterilized in the digester present a solid, opalescent base, whatever precautions are taken.

Many operators add to ordinary gelose a quantity of glycerin varying from 1 to 3 to the 100; this substance, which in some cases favors the development of micro-organisms (bacilli of tuberculosis, Nocard and Roux), also prevents the rapid drying of this nutritive medium.

3d. To obtain the nutritive jelly of lichen, we may use washed Fucus crispus either in a beef bouillon prepared in advance or in a bouillon of peptone prepared on the spot; the quantity of fronds of lichen carrageen to be added to the litre of liquid varies from thirty to forty grams, according as it is fresh or dry. After an infusion at 100° C., prolonged during several hours, the decoction is passed through a sieve which retains the mucilaginous fronds of the lichen, and the filtrate is again carried to ebullition, then passed through bolting-cloth placed in a funnel for cold filtration. The limpidity of this nutritive medium is never perfect; it preserves a slight opalescence less than that of gelose. This nutritive medium may be employed for solid cultures which call for a temperature between 30° C. and 40° C., but its use is especially indicated in the preparation of plates spread either upon glass or upon paper, and when we wish to color colonies with indigo blue.

4th. Mucilages are prepared with gum tragacanth or with quince-seeds.

We begin by carefully washing the gum tragacanth in cold water, then adding from five to six times its weight of water; it is left at a low temperature during from twelve to twenty-four hours. To the mass resulting from this operation is added several times its volume of bouillon or water, to which two to one hundred of peptone has been added; the whole is then boiled for some minutes and carefully passed through a fine cloth. This semi-solid medium is even more difficult than gelose, but, like the jelly of lichen, it possesses the faculty of swelling again under the influence of liquids after it has been dried upon plates of glass or sheets of paper. Besides quince-seed, we can use mucilages made from linseed.

Mixed Solid Media.—Thus are named jellies prepared when needed, with animal or vegetable liquids, sterilized cold, for the purpose of obtaining eminently nutritive strata for species which require, for instance, to be cultivated in the juice of meat or in vegetable juices, which, as we have already said, do not stand the high temperatures of the digester without the loss of their productive properties.

These media are prepared as follows:

To jelly charged with twenty to one hundred of gelatin, that has been melted at 30° to 40° C., we add, by means of sterilized pipettes, the vegetable or animal liquids sterilized by cold filtration; they are mixed with the melted gelatin by stirring for a long time. The media thus obtained are placed in the stove for about twenty days, in such a way as to prevent the introduction of any germs capable of altering the accuracy of the final results. When a preliminary analysis gives a negative result, these mixed media may be experimented with, the same as nutritive jellies sterilized at 110° C.

We now know the various instruments and the different media used in quantitative analyses of water; there remains for us to learn how these bacteriological researches are carried on.

IV. The Preliminary Analysis and the Different Processes Used for the Numerical Estimation of Bacteria in Water.

This rapid enumeration consists in determining preliminarily, in a very short space of time, the approximate wealth of bacteria in water. It is necessary to use it when making

use of the fractional method with bouillon; it is also very serviceable in the analyses of gelatin plates when we have no idea of the probable quantity of germs in the liquid.

This analysis is made thus: The water having arrived at the laboratory, it is distributed drop by drop, in its natural state, into four to five specimens of sterilized bouillon; then it is diluted to 1:100, to 1:1,000, to 1:10,000, and to 1:100,000 if it is thought necessary. A drop of these various dilutions is introduced into a series of twelve little vessels of bouillon. These specimens are exposed between 30° and 40° C. for twenty-four hours. At the end of twenty-four hours, a simple glance shows to what power the water received ought to be diluted.

To illustrate: If, for instance, two tubes out of twelve which have received a drop of water at 1:1,000 are altered, we may be certain that the water contains at least 4 bacteria $\times$ 4 to the gram of water at 1:1,000, for the reason that on an average, at the end of twenty-four hours, a quarter of the bacteria to be hatched in the bouillon manifest their presence by a disturbance or by special deposits which are perfectly visible.

Then one gram of the given water will present at least 16,000 bacteria. This valuable idea serves to establish the dosage upon a certain basis. It is true that the quantitative analysis is thus retarded for twenty-four hours, and that during all this time we are forced to keep the specimen in ice; but that is of no great importance: qualitative analysis, the most useful, can be commenced upon the arrival of the water.

The Method of Fractional Inoculation of Liquids.—Adopting as an example the preceding case—that is, that of a water which diluted at 1:1,000 shows 16,000 bacteria to the cubic centimetre at the preliminary analysis—it is easy to conclude that, each cubic centimetre of water at 1:1,000 previously containing about sixteen bacteria, the specimen of bouillon must have added one drop of a 1 to 3,000 dilution in order to show an alteration in the proportion of twenty to the one hundred. I do not insist upon this delicate process and one so difficult of application for beginners; but through inoculations multiplied by one, two, and three drops we make the result much less uncertain and leave the operator absolute master of the choice of the series of cultures; we permit him also to reject the series which have been too richly altered.

I pass without further delay to the description of the process I have called mixed, based upon the fractional dilution of water in gelatin on plates.

Mixed Process.—Here the operator is no longer disturbed by the fear of excessive rate in alterations of specimens; it matters little to him whether all the plates show one, two, and three colonies; these microphytic spots will be separated at least from each other by a convenient space, and he will surely be able to perceive them by examining the inoculations daily; while the disturbance in the vessels of bouillon does not at all indicate to him whether it is produced by one or several bacteria. The operator renounces, it is true, the benefit of incubation at the temperature of 30 to 35° C., which is a point to be considered in very exact analyses; but I imagine that the chief object is to obtain comparative results and simply the relatively unimportant indication which follows from ordinary quantitative enumeration.

The water diluted to the desired state, it is inoculated in doses of one or several drops in conical flasks containing a bed of 5 mm. to 6 mm. of gelatin which has previously been melted in a stove heated to about 40° C. I generally employ about a dozen of these flasks; this permits obtaining very close results, and does away with any possible accident to the analysis, such as frequently occurs (breaks, premature liquefactions, invasions of mould, etc.). If one or two bottles are found in bad condition, there always remain a sufficient number to permit of exact calculation of the number of germs.

Although this calculation may be very simple, I do not consider it out of place to give the general formula:

If A drops of water, at 1 : b 10^n, have given a number C of colonies, 1 c.c. of natural water will contain

$$\frac{25 \times C \times b \times 10^n.}{A}$$

It is supposed in this case that the pipette furnishes twenty-five drops to the cubic centimetre. Every quantitative analysis is summed up in these few lines.

I have not told how bacteria colonies are to be distinguished from colonies due to mould—a few days' experience will teach this to the operator; however, there are doubtful cases in which only the microscope will settle this question definitely.

The bacteria which develop upon plates are either aerobic, indifferently aerobic, or anaerobic; it is sometimes important to cultivate anaerobic organisms in water—that is, those unable to develop when absolutely deprived of oxygen, like the septic vibrion and the bacillus of symptomatic carbuncle. For this purpose many methods have been recommended: the culture of plates in inert gases, nitrogen or hydrogen; some operators have even advocated illuminating and carbonic acid gas, as if the last two gases were not poisonous to bacteria; the vacuum has been tried with very good results. For my part, I have described a much more practical process for the culture of anaerobic species, which consists in using gelatin or bouillon, separated from the surrounding air by a sufficiently thick bed of a substance, fusible at 40° C., formed of a mixture of vaselin and paraffin. I use for this purpose very narrow test-tubes full of bouillon or gelatin reaching as far as the middle of these tubes, which then receive a bed of the fusible hydro-carburet, and the system is placed in the digester at a sterilizing temperature of 110° C. which also expels all loose air. The oils employed by some operators are not as serviceable.

Although perfect anaerobic organisms may be relatively rare in spring and river waters, they are abundant enough in water contaminated by the residue of manufacturing ferments (indigo vats, starch factories, tanneries, etc.), in the waters of sewers and drains; so some useful information may be obtained from their estimation.

For this purpose we melt, in a bath of water brought to between 40° and 50° C., the gelatin and the isolated bed of the narrow tubes; then, by means of a scorched tube graduated to a very fine point, we introduce into the midst of the liquid the quantity of pure and diluted water, which is to be dosed with anaerobic bacteria; then the vessels are exposed to 20 to 22° C. At the end of a greater or less space of time there may be seen appearing in the mass of gelatin schizophytic colonies presenting the customary form of anaerobian colonies; sometimes these colonies are surmounted by a more or less voluminous gaseous bubble. After fifteen days' incubation the colonies, having become visible, are counted through the glass as if it were a question of bacteria hatched upon plates. When we desire to study the species born without air, it is necessary to sacrifice the tube; it will then be better

to reserve these instruments simply for the enumeration of anaerobics, and to employ for their special study vessels which I will describe later. In closing this paragraph it remains for me to describe the refrigerating apparatus which I have had made for my laboratory for the purpose of keeping the water at a temperature of 0° C.

As indicated by Fig. 13, this apparatus consists of two boxes—the inner E′ intended for specimens which must be maintained at 0° C., and the outer E serving as an envelope

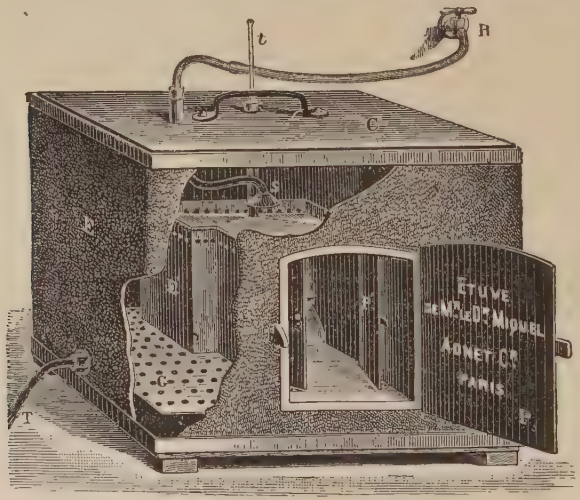

Fig. 13.—Refrigerating Apparatus for Low Temperatures.

for the first. The inner, E′, is 0.26 m. in breadth, 0.22 m. in depth, and 0.20 m. in height; it communicates with the outer air by means of a passage furnished with two doors, P′ and P; the latter P is fitted to the external envelope.

The refrigerating box E rests upon a false bottom G, provided with openings in order to permit the flow of water from the melting ice; this escapes by the tube T; in this way this melted water is prevented from coming in contact with the inner box.

The box E designed to hold the ice, is 0.50 m. wide, 0.50 m. deep and 0.40 m. high; it is surrounded by isolating felt, and a cover C with a double wall, in the interior of which is placed sawdust or powdered charcoal; a thermometer T passes through this cover and penetrates into the inner box; it is protected by a metallic sheath.

When we wish to use the box, it is filled with pieces of ice in such a way as to keep the level of the pieces of ice at least up to the height of the inner box E′. The temperature shown by the thermometer is invariably 0° C.

This apparatus may also serve as a refrigerator for temperatures between 0° and 25° C.; by means of a tube furnished with a sprinkler S, a more or less abundant flow of ordinary water takes place for temperatures between 14° and 20° C.; for colder temperatures, a stream of iced water is used, which causes temperatures from 4° to 15° C.

We can also, by means of regulators such as I have had made by M. Adnet, the manufacturer of this refrigerator, maintain a fixed temperature of between 4° and 20° C. in the inner chamber when the surrounding temperature is raised to 20° C. or higher.

V. Approximate Processes.

Besides these processes of micrographical analyses of water, there are others which I have previously described in which there is less precision from a qualitative and quantita-

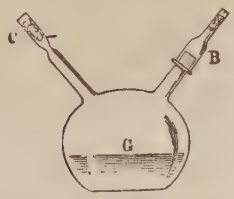

Fig. 14.—Flask for Sterilized Jelly of Lichen and Mucilage.

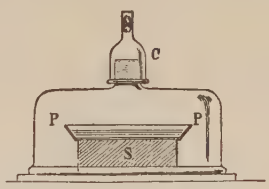

Fig. 15.—Incubating Vessel for Gelatin-Coated Paper.

tive point of view, but which possess a comparative value as they are useful for simple comparisons.

The vegetable jelly of lichen, the mucilage of quince-seeds, of linseed, and of gum tragacanth, are used for the kind of analyses which I am about to mention.

First Process.—Into a series of flasks of 100 c.c. capacity (see Fig. 14) we introduce 30 c.c. to 40 c.c. of peptonized jelly of lichen; then these flasks are sterilized in the digester at 110° C. for a half-hour. At the same time we free from germs, either with the air-bath or in dry vapor, a system formed of a tubulated bell-glass with movable cap C surmounted by a chimney (Fig. 15). This bell-glass fits very exactly upon a

plate of glass polished with emery, supporting a very thick plate of glass upon which is a sheet of square or round bristol paper PP, whose edges are raised in order to form a little basin.

When we commence the analysis, the jelly of lichen is melted at 40° C., and poured through the tube of the bell-glass upon the bristol paper; at the same time we add to this jelly the water whose bacteria are to be enumerated, distributing this water as regularly as possible over the surface of the lichen jelly by finally resorting to some forward and backward rocking. The apparatus is soon in operation, and is then left in the stove, heated to 30° C., for fifteen to twenty days.

At the end of this period, the paper is taken away from under the glass, quickly dried in a stove having a current of warm and dry air or by cold, sheltered from dust in the vacuum, upon a crystallizer filled with dried chloride of calcium. There remains now only the staining of the colonies developed on paper, and their enumeration.

The jelly of lichen is easily prepared, as I have said, by macerating white lichen (Fucus crispus) held in a fine linen bag in bouillon of beef or of peptone, filtering, and heating to about the boiling-point; the quantity of lichen to employ is fifty grams to the litre. The liquid thus obtained is filtered warm through bolting-cloth or a wad of absorbent cotton. Whatever may be the limpidity of the filtrate, the lichen jelly in setting becomes opalescent or a little cloudy; but this presents no inconvenience.

Second Process.—This second process is based upon the faculty which lichen jelly possesses of promptly absorbing a considerable volume of water after it has been dried in thin layers upon sheets of paper. This ground, barren in a dry state, recovers its nutritive faculties and can after proper moistening nourish bacteria, which develop upon both sides of the paper.

Thus, the micrographic analysis of water by nutritive paper is very simple. The nutritive paper cut in rectangular pieces and provided with a suspending wire of platina is enveloped in tissue paper, placed in the digester, and heated for one hour at 110° C.; the paper issues from the apparatus dry and freed from germs.

When analyzing, it is hung by its platina wire in a jar

closed with emery (see Fig. 16); then it is weighed and plunged into the water to be analyzed; the nutritive stratum rapidly swells, and the operation is finished in five minutes. The weight of water absorbed is then ascertained, and the whole is placed in a stove under a bell jar the air of which is also saturated with moisture.

The colonies are not long in developing, in differently colored points, upon the nutritive paper; while they are very confluent when the water is impure, they are infrequent when the water is poor in bacteria and in mucidness. After eight to fifteen days, when assured that the number of spots does not sensibly increase, the paper is withdrawn from the incubating vessel and placed in a heated air stove at about 45° C.; when the paper is perfectly dry, the microphytic colonies, which had almost become invisible, since they do not belong to the chromogenic species, are stained in the following manner:

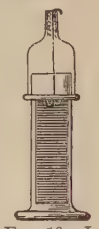

FIG. 16.—INCUBATING FLASK FOR STRIPS OF NUTRIFIED PAPER.

Technique of Staining.—A. The nutritive paper, old or new, dry or moist, covered with microbian spots or mildew, is plunged for some minutes in a watery solution of crystallized alum, then in ordinary water.

This preliminary operation serves the double purpose of lightly dissolving the jelly and of corroding the surfaces to be stained.

B. The strip of paper, well washed, is then immersed for twenty to thirty seconds in a solution of sulphate of indigo containing two grams of pure indigotin to the litre. This bath is prepared as follows: Two grams of crystallized indigotin are placed with 40 grams to 50 grams of fuming sulphuric acid, and the resulting compound is put into one litre of water; this very acid liquor is then partially neutralized and the solution is ready for use.

At the contact of the sulph-indigo liquor, both paper and bacteria are promptly colored: the colonies and mildew are stained very dark, and become easily visible upon the lighter tint of the jelly.

C. It is now principally a question of replacing the clear blue ground of the jelly by a white ground; this is accomplished by introducing the sheet, after carefully washing it,

into a bath of permanganate of potassium of 1:1,000; the clear blue tint of the jelly changes to violet, then to red; it is washed a third time, and the operation is completed. It is important to watch this last manipulation, which lasts about half a minute, closely: the too prolonged action of the permanganate weakens the tint of the colonies; if this error has been made, it may easily be repaired by replunging the paper into the indigo.

D. To give a lighter color and to immediately arrest the discoloring action of the permanganate remaining in excess upon the jelly, the strip of paper is allowed to remain for twenty-four seconds in a weak bath of oxalic acid (three to five in the one hundred); then finally it is washed in clear water.

The bacteria and mildew finally appear of a fine blue color upon a white ground; as they dry, the colors become more intense.

VI. Case for the Bacteriological Analysis of Water.

This case consists of a box about 0.38 m. high, 0.35 m. wide, and 0.22 m. deep (see Fig. 17); it is built of two stories. The lower story is composed of a drawer divided into fifteen compartments, each designed to receive a plate of gelatin in conical flasks 5 cm. diameter at the base.

Immediately above this drawer there is a metallic plate of sheet brass, which can be drawn out, and is intended for melting the gelatin upon the very spot of the experiment; it is sufficient for this purpose to heat it by means of the alcohol lamp represented in the figure, above which are placed the conical flasks.

The upper story of the box contains two diluting-vessels each capable of holding five hundred grams of sterilized water, two vessels of fifty grams capacity, and finally two Freudenreich flasks holding 10 c.c.; at the side of these vessels are placed the alcohol lamp and the flask intended to contain this inflammable liquid.

In a rack placed at the farthest wall of the box are placed test-tubes, graduated and sterilized pipettes, and pipettes for fractional dilution, all sterilized.

This summary mention will be sufficient for those who

have read attentively the few pages given to the description of the apparatus used for the analysis of water by the mixed process. This case also contains some flasks, some plates reserved for qualitative analysis, and a special little vessel

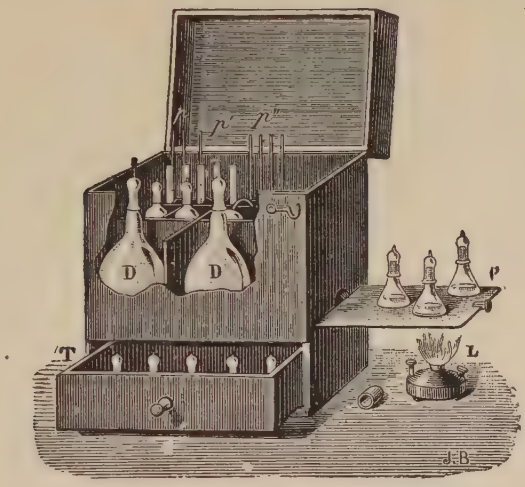

FIG. 17.—CASE FOR THE BACTERIOLOGICAL ANALYSIS OF WATER. Made by the firm of Alvergniat.

with movable, tapering cover provided with two openings, a sort of spherical pipette, which serves to gather the water to be analyzed and to convey it to the laboratory in order to make the final analyses whenever convenient.

CHAPTER IV.

QUALITATIVE ANALYSIS.

I. General Considerations upon the Methods of Investigation.

Many operators believe their task well advanced, if not terminated, when, after all the mechanical operations of inoculation and enumeration, they have succeeded in determining the number of microbes to the cubic centimetre capable of being developed upon a gelatin plate; statistically this figure is not absolute, as I have taken pains to show, for it does not take account of the numerous bacteria which may develop above 22° C. nor of those which never grow in the almost neutral nutritive jelly used in bacteriological laboratories.

If these same experimenters would assure themselves, by the microscope, to what species the organisms forming the colonies belonged, this work would represent an indication not devoid of interest; it would be at all events a step toward the botanical determination of the species. Generally, I regret to say, this simple work is not done; yet what would we say of a chemist who, intrusted with the analysis of a mineral, should report that the specimen submitted to him contained one gram of a white substance, three grams of a yellow substance, and ten grams of a metallic substance? We would certainly ask him to specify the nature of the colored bodies, to complete the qualitative researches, and finally to give a name to the substances that are in no wise characterized by the statement of a single property. The analysts who content themselves with designating the bacteria by the expressions of red, yellow, or white colonies occupy precisely this same positon: they say nothing which can enlighten those interested, upon the nature of the microbes of the water which they are examining, from a micrographic point of view.

And yet the micrographist can and should say whether

the liquid sent him contains micrococci, bacilli, bacteria, or vibriones and in what proportions these are found in it; he can also determine which among these species are pathogenic, zymogenic, chromogenic, rare, or common. During the fifteen years or more devoted to bacteriological analysis of water, I have been able to isolate different specimens of many thousands of bacteria possessing well-defined morphological characteristics and very diverse biochemical properties. I know, for example, a dozen lactic ferments, five or six butyric ferments, a dozen sulphydric ferments, three bacteria attacking red and white phosphorus so as to produce phosphorated hydrogen, forty ammoniacal ferments, many acid ferments, some alcoholic bacteria, sixty species of bacteria capable of producing putrid fermentation, four of which have produced a characteristic stercoraceous odor in gelatin and bouillons: the presence of these last bacteria is a certain indication of the contamination of water by matters issuing from the digestive canal of man or animals, etc.

As may be inferred, a complete micrographic analysis is not an easy operation: it necessitates much experience and very extended knowledge. In order to accomplish all that is actually possible in the qualitative analysis of microbes in water, it is necessary to possess accurate ideas of microbotany, chemistry, and medicine, without which one is handicapped at every step; while, on the contrary, in order to effect a simple quantitative enumeration, it is quite sufficient to be, if I may be permitted this severe but just expression, merely an intelligent laboratory boy.

No one—I speak of those with experience in bacteriological essays—will deny that my criticism is well-founded, nor will refuse to confess with me that the complete biological analysis of water is an operation attended with difficulties, which can only be done by scientists who have devoted much time to bacteriological studies.

The careful analysis of a water may require many weeks or even months of difficult and constant work; in the actual condition of our knowledge, it is often impossible to complete it, for the reason that many bacterian species encountered are still unknown to us and require to be determined by studies to which no one has as yet devoted himself.

But, because the qualitative analysis of water is still some-

what impracticable, does it follow that it should not be attempted, considering the proofs, unfortunately incomplete, presented to us by the history of these infinitely minute organisms? To do nothing because there is too much to do, is bad reasoning, and the analyst should not avail himself of it.

The immensity of the work to be accomplished is what especially terrifies the beginner; the methods for arranging his researches in proper order are confusing to him. I shall deter some from the attempt by declaring in advance that I find them very incomplete and above all very imperfect.

Upon its arrival at the laboratory, the water to be studied from a quantitative point of view will be distributed in several sterilized vessels, and these various specimens will, as soon as possible, be made the object of the special researches that I am about to describe.

By the action of some physical agents we are able to isolate various groups of bacteria which are lost in the crowd of ordinary species.

The same end is attained by the aid of some chemical agents; but I wish to add that there are numerous other resources at one's disposal if he understands how to utilize them.

Among physical agents, heat seems to be most trustworthy. Water kept in an elongated glass vessel furnished with a movable and tubulated cap or any other aseptic means of closure is first arranged into various plates; then this vessel is placed in a bath whose temperature is slowly and progressively raised to 100° C. As it ascends, we take away, at the stages which I consider most important—that is, at 50°, 65°, 80°, 100° C.—some cubic centimetres of water which are distributed into vessels of bouillon, gelatin, and on gelatin and gelose plates.

The gelatin first inoculated will serve to determine the species growing at a low temperature; nutritive gelose exposed in stoves or, better still, in baths heated to 30°, 40°, 50°, 60°, 70° C. will permit the discovery of the species I have called thermophiles, whose development is not especially noticeable below 40° C. These microbes belong for the most part to the endospore bacilli; yet all endospore bacilli do not grow readily at 40° to 50° C.; it is for this reason that the gelatin and gelose plates kept at 20° to 30° C. will often

furnish organisms whose spores have the faculty of resisting from 80° to 90° C. and sometimes from 90° to 100° C., when the adult beings who proceed from them are already strongly tried by temperatures above that of the human body.

So, then, by associating the fact of the destruction of bacteria by heat with their faculty for growing at more or less high temperatures, we succeed in the discovery of several species which would otherwise have been sought for in vain among the numerous bacteria hatched upon gelatin plates formed with natural or diluted water.

By using heat and chemical reagents simultaneously, very encouraging results are obtained, as is shown by the researches of Dr. Vincent upon the typhus bacillus.

This method consists in adding greater or lesser quantities of a determined reagent to a known volume of gelatin or bouillon, in order to obtain a medium capable of favoring the exclusive development of a species or of a little group of species.

The reagents which may be employed for this purpose are numerous enough; I will shortly mention the most important of them.

Moreover, to disclose the zymogenic properties of some species, we may use saccharose, alcohol, glycerin, urine, and finally coloring reagents; the latter are valuable in giving direct evidence of the acid or alkaline nature of bacterian secretions; of these there may be employed litmus, cochineal, Coupier blue, hematoxylin, etc.

The sulphindigotate of soda may be used for ascertaining the reducing power of some microphytes.

Litmus and the other coloring substances are differently influenced by various species: sugar and glycerin serve for the research of some special ferments; organisms of sulphydric fermentation blacken the salts of lead; urine shows the presence of an entire group of bacteria very widely diffused in nature; mercury and iron added in minimum doses paralyze the development of various tribes of bacteria, while they do not effectually oppose the development of others.

The method I am about to mention, judiciously applied, leads to very remarkable results; but it necessitates the previous study of the properties of the microbes which are generally found in water.

In a careful qualitative analysis, each microbe must be examined with reference to its morphology and its biochemical properties, which may be disclosed either by the direct action of the micro-organisms upon the substance dissolved in culture bouillons, or by the products of secretion of these very micro-organisms which are often of a diastasic nature; finally, by the inoculation of the microbe itself, or the secreted diastase filtered through porcelain, its pathogenesis may be established. By means of these researches, one will not only succeed in forming the basis of a correct diagnosis of the species, but also in establishing the degree of virulence it exercises toward animals.

As may be seen, we are really very far from the ordinary quantitative estimation; the analyst and more or less skilful reader of colonies should now be succeeded by the experimenter gifted with special aptitude and the possessor of very extended bacteriological knowledge. I may be permitted to doubt if in a dozen lessons, as has been affirmed, it is possible to render pupils capable of approaching the arduous question of the qualitative enumeration of water in which difficult problems are met at each step.

Considering, on the other hand, that it is of special importance to those interested that the analysis of water should be, above all, qualitative—that is, of such a nature as to enlighten them upon the number and quality of harmful species contained in the waters used by such or such a population—it is seen that it is not easy for the analyst to escape the obligation of obtaining all knowledge which belongs to the qualitative and quantitative estimation of water.

II. The Study of Anaerobic Species.

The anaerobe discovered by M. Pasteur, disputed at first by M. Brefeld and various other scientists, is to-day universally admitted; the observation of the anaerobe among micro-organisms presents a very valuable means of characterizing certain bacteria and of separating from this class the organisms called by contrast aerobes.

We call that microbe anaerobic which can exist without oxygen and which is capable of breathing through the oxygen of plastic or hydro-carbonaceous substances. Many of these

anaerobic organisms can also multiply by contact with the air, thus even presenting a very luxurious vegetation; these beings are then called optional anaerobes; we might, it seems to me, reserve the name of perfect anaerobes for micro-organisms which can only grow absolutely sheltered from the oxygen of the air, as, for example, the microbe of tetanus and of symptomatic carbuncle.

For the cultivation of anaerobes, there are numerous processes, all evidently having the object of shielding the micro-organisms and their germs from the action of oxygen. M. Pasteur has employed for this purpose vessels entirely filled with sterilized, fermentable liquids; the neck of these vessels tapers off and is curved like the neck of a swan and is plunged into mercury freed from germs. Dr. Buchner has advised the absorption of the oxygen in the interior of the culture itself by means of alkaline pyrogallates. Dr. E. Roux has thought, with reason, that the anaerobic organisms might become charged during this absorption, which, in Dr. Buchner's plan, is left at the mercy of oxidizable chemical substances. Even the vacuum may be employed successfully; and in default of that, inert gases, such as nitrogen and pure hydrogen, may be introduced into the medium of culture; first, however, we must get rid of the oxygen gas; then we can surround them with the inactive gas.

Others have wrongly employed carbonic-acid gas and illuminating gas; these, while they do not threaten the life of several anaerobic microbes, kill or paralyze the development of a large number of species.

Of all these processes, the method first employed by M. Pasteur seems to me to give the most satisfactory results; for it is easier to drive out the air contained in the nutritive substances or clinging to the vessels by heat than by the air pump, the working of which is not always perfect. To obtain a favorable medium for anaerobes, then, it is sufficient to completely drive away the oxygen of the air; this done, we must prevent its again coming in contact with the nutritive medium.

Bouillons are easily obtained from gelatins and from gelose absolutely deprived of air by covering them over, after sterilization, with a thick bed of a mixture of paraffin and vaselin—

Vaselin, ...	98 parts
Paraffin, ...	2 "

To this composition may be added a few hundredths of pure wax; this increases the infusibility of the mixture, which does not then melt at a temperature of 40° C.

For cultures at high temperature, we may use to advantage the following compound; it is true that it is apt to retract at its centre, but it is very adherent to the glass and infusible at 50° C.:

Vaselin, ...	90 parts
White wax, ...	8 "
Paraffin, ...	2 "

These compositions are impervious to the air; they are sufficiently plastic at ordinary temperatures to take the shape of the vessels under the influence of atmospheric pressure; besides they allow the liquids to expand without loosening from the walls of the glass vessels; consequently not the least drop of the liquid escapes. By the use of extreme precaution, we may also, if desired, place above the solid bed a layer of mercury several centimetres thick.

To accomplish the same end, oils and hydro-carbonaceous liquids at ordinary temperature have been advised. I do not believe that these substances offer an absolute protection against the access of air to the surface of the nutritive media. The use of oils cannot be recommended; they often disturb the nutritive media, partially saponify in the digester, and in short only present inconveniences and not a single advantage.

Fig. 18.—Freudenreich's Flask.

For the research and culture of anaerobian organisms, I advise the use of Freudenreich's cylindrical flasks (see Fig. 18) three to five centimetres in diameter, provided with a bed of jelly or bouillon 0.02 m. thick, upon which is placed a layer of paraffined vaselin of even thickness. We may also employ little test-tubes, not too narrow, and of limited length. These vessels, sterilized in the digester, once cooled, are ready for use.

They are employed as follows:

The vessels containing the nutritive media are placed in the stove, heated to about 45° C. until the white isolating layer has become dissolved and appears as a perfectly clear liquid Then, by means of a graded, pointed pipette, we intro-

duce the liquid to be analyzed into the nutritive stratum bed, giving the pipette a slow circular movement during the dropping of the water to be analyzed, in order to spread it as evenly as possible in the gelatin. When operating with bouillon this precaution is unnecessary.

We proceed to the study of the species developed without air in the liquid cultures by means of very finely pointed pipettes, going right through the isolated bed; or, if the colony is formed in jelly, we may, by means of scorched glass tubes with thin walls, move the isolating bed in the direction of the colony; this tube digs, so to speak, a sort of pit as far as the solid substratum, into which we insert a platinum wire to take away some particles of the colony in the customary manner. If the operator has some skill, he may, instead of using the platinum wire, continue to bury the glass tube in the nutritive layer, and may grasp the microbian vegetation in its entirety; he may easily draw it out by a brisk movement, at the same time turning the tube, whose upper end is hermetically sealed, with the fingers. The tube acts in this case as a knife; by blowing forcibly into its upper end, the nutritive substance inclosing the colony will be forced out.

The quantity of water to be introduced into the nutritive media for the study of anaerobian species should be about one hundred times greater than for the enumeration of bacteria by the mixed process.

The water of the Vanne, for instance, contains very few anaerobian organisms (from two to ten to the cubic centimetre), while it shows on an average 800 bacteria in the same volume of water. River water should be diluted the 1,000th part, and one cubic centimetre of this dilution is added to the media sheltered from air. Sewer water will only be diluted 1:10,000, etc.

The observer who devotes himself to the study of anaerobes must not lose sight of the fact that the gelatin kept sheltered from atmospheric oxygen, although not visibly studded with colonies, contains invisible germs which await only the access of a little air to make themselves manifest. This consideration, then, will necessitate great care in the study of these species; the operator will take the germs destined for cultures from the very heart of the colony, and will proceed to the successive purifications which are effected away from the air.

Most of the anaerobian microbes cultivated are also aerobes, the perfect anaerobes being very rare.

It is by a subsequent study in preparing cultures at 30°, 40°, and 50° C. in bouillon and gelose that we succeed in characterizing these different species. Here especially we should mistrust gelatin, which often proves improper for the development and multiplication of perfect anaerobes; while, on the other hand, these grow very well in peptonized bouillon charged with sugar or a little glycerin (two to about one hundred).

III. The Study of Zymogenic Species.

In the case we are now considering, it is a question of determining the ferments to-day known under the names of lactic, butyric, and acetic ferments; the microbe producers of alcohol and hydrosulphurous acid; the agents of the transformation of urine into carbonate of ammonia, of nitrification, etc. In order to diagnose these species endowed with very distinct biochemical attributes, it is important to leave in the background all microscopic characters of modes of growth and aspect of cultures, and to place these species in media where they are capable of producing the substances they originate in abundance. We should then be able to make sugared media, alcoholic, those charged with urine, sulphur, salts of ammonia, etc.; but as it is difficult to have at one's disposition in advance, even in a well-stocked laboratory, sterilized media of culture charged with all varieties of sugar and other substances proper for the characterization of ferments, one must be content to have at hand both solid and liquid nutritive media, typical or normal, to which can be added extemporaneously, at the moment of inoculation, a certain volume of such appropriate solution sterilized in advance.

If to 9 c.c. of dissolved gelatin we add 1 c.c. of simple syrup, a medium will be obtained containing about ten to one hundred of saccharose; if it is an equal volume of solution of urine at fifty to the one hundred that is added to 9 c.c. of gelatin, the medium formed will contain a quantity of urine equal to fifty to the one thousand, etc. To make manifest the sulphydrogenic qualities of various microbes, some hundredths of precipitated sulphur are added to the bouillon or jelly; to favor the development of phosphoretted hydrogen that some

bacteria may determine, the sulphur is replaced by a mixture of red amorphous phosphorus. The latter resists sterilization by the digester very much; sulphur is readily freed from germs at 100° C.

After having learned, by preliminary analyses and the production of special substances, the zymotic nature of the species, we proceed to the study of the fermentation which determines the micro-organism, in order to establish beyond a doubt the reality of its properties which had only been suspected.

The nature and quantity of the products of these physiological actions will surely permit us to assign a place to the microbes under consideration, either among known ferments or by the side of these, if literature has not yet mentioned them.

The observer will often be surprised to discover, among the number of organisms coming under his observation, ferments which differ essentially in their morphology and the peculiarities of their culture from the species already known; these ferments will have a very varied power of action: but that is not to be regretted, for, I repeat, by the side of really too precarious physical characteristics common to a large number of bacteria, this inequality of physiological faculties will permit us to give, to the species found, a rank in accordance with the degree of their energy.

I do not intend to review successively all the ferments, nor to study their characters, powers, and various qualities; I desire to reserve a few pages of my pamphlet to rapidly tracing the broad lines of a complete bacteriological analysis. The indications which I do not give here will be found in treatises on biological chemistry, and better still in the original memoirs furnished upon these matters by micro-biologists to whom is due the discovery of various ferments; for I have often recognized that, yielding to the necessity of condensing many facts into a few pages, authors who make a specialty of writing treatises omit, by force of circumstance, many important things which are far from being devoid of interest to the analyst.

The microbes which resist physical agents, and especially heat, present a very variable sensibility toward chemical reagents; some die, or at least do not develop in the presence of

1:1,000 mineral acids, of 5 to 10 in the 1,000 of organic (tartaric or citric acids); while there are other bacteria which can grow very abundantly in media in which the proportion of these acids is considerably greater (2 to 3 in 1,000—sulphuric, hydrochloric, nitric; 10 to 20 in 1,000 of tartaric and citric acids). Using these facts as a basis, we may accomplish the separation of species and at the same time establish a very faithful diagnosis of their characters. Like acids, we may make use of alkalies, of caustic soda 1 to 5 to the 1,000, of carbonate of ammonia 1 to 10 to the 100; and we may establish the fact that, though in general alkalies are favorable to the multiplication of bacteria, there are many cases in which they impede this.

The resources offered us by chemistry are, so to speak, unlimited; besides acids and bases, we may employ mercurial preparations in very weak strength (1:10,000, 1:100,000), salts of iron, copper, lead; antiseptics: sugar, carbolic acid, thymol, iodoform, and other substances whose enumeration is not necessary. The process based upon the unequal antiseptic power of some substances upon bacteria is valuable for the isolation of saprogenic bacteria. Since a considerable period I use for this purpose sea salt in proportions varying from 5 to 15 to the 100, glycerin in proportions of 10 to 20 to the 100, borate of soda and boric acid in the proportion of 1:100, benzoic acid, salicylic acid in the proportion of 1:2,000, hydrocyanic acid in that of 1:5,000. As a powerful modifier for culture media I place iodine in the first rank; this substance, added in very minute quantity to bouillon or nutritive jelly, renders them remarkably barren to many species; bromine acts in the same manner.

All these means of investigation are good, especially when one desires to effect the qualitative analysis of a water with a relatively large volume of liquid; and, strictly speaking, it should always be thus, for it does not seem to me sufficient to study qualitatively the micro-organisms contained in only a cubic centimetre or a fraction of a cubic centimetre of water.

Like sugared media or others employed in the study of ferments, acid, alkaline, or antiseptic media can be prepared in proportions as needed, by adding the desired quantity of sterilized solution of the chemical substance to a certain volume of gelatin. In order to keep these solutions sheltered from the dust of the air and accidental contamination, we em-

ploy flasks furnished with an antiseptic stopper; the flasks which seem most convenient to me are those which have a movable cap to which is soldered a pipette and a lateral tubular arrangement provided with a wad of cotton wool in order to prevent the escape of the liquid through the pipette during sterilization and to assure the constant re-establishment of atmospheric pressure in the interior of the flask.

I will mention briefly the various means at the disposal of the micrographist in aiding him in the discovery of species, when the methods of frationizing in bouillon and the inoculation of bacteria on plates are impracticable. In devoting himself to these various operations of analysis, the micrographist will not only have the satisfaction of discovering in the water bacteria already known, but many others which have not been made the object of any study; by analyzing with care he will always be able to publish not only researches the interest in which may be open to dispute, but also works which will be very useful for bacteriological science.

IV. The Study of Pathogenic Species.

The aim of the micrographist in bacteriological analyses of water should undoubtedly be the discovery of pathogenic organisms; that is, the species dangerous for man and domestic animals, who aid him by their muscular strength or nourish him with their flesh. Outside of the interest attached to all scientific research, we should never neglect the aspect which furnishes profitable indications to humanity; hence I believe it to be of capital importance to devote one's self to experiments in order to learn whether a liquid serving for the alimentation of an entire population does or does not contain micro-organisms capable of more or less seriously affecting public health. Unfortunately it must be confessed that among the numerous affections which especially afflict the human race the etiology of many is unknown; we are ignorant, for instance, of the microbes of small-pox, of measles, of scarlatina, and of athrepsia; I speak only of diseases endemic in our climate and which sometimes assume a very fatal form. The micro-organisms which produce typhoid fever and cholera are better known; nevertheless, the fact of their being specific is still discussed. Dr. Klein does not admit the pathogenic prop-

erties of the spirillum of Dr. Koch; many believe that the bacterium coli commune is the cause of typhoid fever, and not the bacillus discovered by Eberth. Meanwhile it is undeniable that there exist around us very deadly and very harmful bacteria, such as the bacillus anthracis, Nicolaïer's bacillus, and the organisms of septicæmia, which are found in the soil and in water.

The utility of micrographic analyses in relation to pathogenic bacteria is enhanced by the fact that, besides the intoxication which may be produced through the digestive canal, our body often presents other open doors to infection; for instance, the lesions resulting from a physiological act like that of recent confinement, or those which are the consequence of injuries. The washing of wounds with impure waters may be the starting-point of grave and even fatal accidents; and if the surgeons in our hospitals see their statistics of cures improve from day to day, it is due to the incessant war waged against the lower organisms by means of antiseptic dressings.

Thus, the study of pathogenic microbes in water should actively engage the analyst; still he should limit himself to the determination of known pathogenic microbes and refuse to extend his investigations to microbes whose existence is simply suspected and which bacteriologists have not yet been able to discover, even in the body of the patient. It is not rare to receive the apparently natural request to study all the pathogenic bacteria in a given water—a request to which it will probably not be easy to respond for a long time. Often also I have been asked to search for the microbe of mumps or scarlatina. If such discoveries could be made, they would no doubt be very praiseworthy for the analyst; in the mean while, we must agree that it does not come within the current practice of enumeration to begin at the very outset with the determination of pathogenic agents which it has been impossible to isolate in the body of the subject from whom they are obtained.

A micrographist should think of searching the waters only for those species which have been well studied and isolated in the form of cultures. His first care, then, will be to procure very pure specimens of bacteria capable of causing the different diseases, to cultivate these microbes in various media, to

study them under the microscope, and finally to inoculate animals with them in order to observe the lesions they promote. In a word, he will devote himself to an apprenticeship outside of which he will find himself without experience and badly prepared to carry on to advantage the general or particular studies claimed of him.

The importance of this subject leads me to dwell for an instant upon the different microbes in whom the existence of pathogenic power is not dubious. I will briefly mention the way of isolating them in water, and I will recall concisely the characteristics peculiar to each, referring the reader for more extended details to the numerous works published upon bacteria.

The Bacillus of Tetanus.

This bacillus, discovered by Nicolaïer, studied by Freudenreich and many other authors, but isolated to the state of pure culture by Kitasato, is easily enough obtained by keeping the water for one hour at a temperature of 70° C., then, by inoculating this water in peptonized gelose, with the addition of two to one hundred of sugar, these analyses should be practised in the way I have indicated for isolating the anaerobian species.

We carefully study the colonies with the microscope, especially those which take an arborescent form; if among them we discover bacilli terminating in spores, making them resemble short pins, we cultivate these through punctures in gelatin and in bouillon protected from the air. The puncture in the gelatin gives place to the production of a sort of sponge culture, resembling the bacillus of hog cholera; but the bacilli of the former always have a larger terminal spore than the latter.

Mice inoculated with one drop of the bouillon invaded by Nicolaïer's bacillus are killed in two or three days. Ten drops or a cubic demi-centimetre of the same bouillon produces tetanus in a large guinea-pig and even in a rabbit.

Nicolaïer's bacillus is quite frequent in the water of the Seine and of the Marne; it is also found in sewer water.

The Bacillus Anthracis.

The bacillus of malignant pustule discovered by M. Davaine, studied by Pasteur, Koch, and many others, should, it seems to me, be isolated by the following process; at least it is thus that I have been able to produce it in river water artificially infected by a small number of micro-organisms :

The water is kept at 65° C. for two hours, in order to destroy the greater part of ordinary microphytes which do not resist this degree of heat; then the liquid is incorporated in the gelatin, and numerous plates are formed with it. Preferably the grayish colonies formed of entangled filaments like a handful of hair, and again the colonies that furnish myceliform prolongations, are submitted to observation. Cultures in bouillon are then effected, where the species develops, forming a fleecy deposit, which settles in the bottom of the vessel. In gelatin the bacillus anthracis gives a culture in the shape of an inverted cypress-tree which slowly liquefies the substratum. Finally, mice inoculated with the bouillon are killed in less than twenty-four hours, and Guinea-pigs succumb before the end of the second day.

The bacillus anthracis is a large bacillus which develops by contact with the air in almost all media used in bacteriology; in bouillon, gelose, urine, if these media be not too perceptibly acid. While the bacillus of the tetanus is not found in the blood of animals dying from the results of inoculation, the blood of animals dying from malignant pustule swarms with long bacilli with quite square ends.

I have never found the bacillus anthracis in any of the waters used by the Parisian population; I have even searched in vain for it in the sewer waters and in those of the Bièvre, which receives, as is well known, the waste of tanned leather, some of which is certainly carbuncular, as is shown by the cases of malignant pustules observed among laborers in tanneries who come for treatment to the hospitals. If one does not drink carbuncular bacteria in Paris, they are sometimes eaten; for it is not a rare occurrence for inspectors of butchers' shops to be called upon to seize meat infected by the bacillus anthracis: as undeniable testimony of this statement, I may cite the case of two strong men who, by carrying meat upon their shoulders,

contracted malignant pustules upon the neck; one of the two succumbed to this terrible affliction at l'Hôtel-Dieu.

The carbuncular bacterium is sometimes asperogenous (Dr. E. Roux); in this case the water must not be heated above 40° C., in order to avoid destroying the adult bacillus, which it is important to study.

The Typhoid Bacillus.

Eberth's bacillus is separated from water by several processes mentioned by Chantemesse, Widal, Thoinot, and others; I will give here that which seems most simple and certain; it is that of Dr. Vincent:

Into a certain number of specimens of peptonized beef bouillon or of simple bouillon of peptone, containing seven decigrams of crystallized carbolic acid to the litre, we introduce some drops or some centimetres of the water to be analyzed according as it is poor or rich in bacteria. If it is a question of spring water supposed to be contaminated by the bacillus of typhoid fever, we may go as high as one hundred cubic centimetres, taking care to operate in a bottle or flask containing at least one thousand cubic centimetres of bouillon.

The vessels thus inoculated must be placed in a water bath kept at 42° C.; when these vessels have become cloudy, some drops of the cultures are transported into new flasks or tubes of small dimension, half full of carbolized bouillon, and these are exposed to 42° C.; for greater surety, three or four successive inoculations are thus practised.

It must be remarked that the Bacterium coli commune and some other species may also be cultivated in the manner just specified.

Eberth's bacillus is quite easily distinguished from the typical form of the Bacterium coli commune by the very decided characteristics which its culture presents. The bacillus of Eberth, developed upon the jelly plates, appears in the form of pearly, translucent colonies; inoculated upon potato it gives a light brilliant coating; it does not liquefy gelatin, etc. It is not difficult to ascertain the presence of the bacillus considered as the agent of typhoid fever in water; I repeat that this bacillus appears under very exact conditions which characterize it. But this bacillus is often found mixed with an-

other kind of bacillus as mobile as itself, called the bacillus pseudo-typhoid. What is more serious, the Eberth bacillus may itself become the object of marked modifications, and then such cultures in no way recall those found described in classic works.

I called attention several years ago to the existence of these false typhoid bacilli, some of which have appeared in the atmosphere of Paris; and I add to day that a yellow variety of the true Eberth's bacillus is obtained by taking the germs from old normal cultures and cultivating them for some weeks in a medium which is very poor in nutritive substances, such as sterilized river water. Thus it might happen that even a cautious micrographist might allow the typhoid bacillus to escape unnoticed.

The analyst will always simply affirm, with a view of protecting his responsibility, whether or not he has discovered the Eberth bacillus in a water—that is, the bacillus which it has been agreed to consider as the agent of typhoid fever, from its microscopic and macroscopic aspects—until the day when it will be known that this bacillus is simply one of the agents which possesses this faculty in conjunction with several others.

Indeed, the specific nature of the action of this bacillus surprises me all the more because it is rare to encounter a species which has the power of exercising a determined zymogenic function exclusively. The further one advances in the study of the infinitely small, the more he decides that the functions formerly attributed to a single species are common to a number of microscopic species which often have no morphological relationship. Moreover, physiological function exercised by a bacterium may be found in mildews, and, *vice versa*, biochemical actions belonging to mildews may be exercised by bacteria.

Between the questions, Can a water engender typhoid ? and Does a water contain Eberth's bacillus ? there is a wide difference; the micrographist should always refuse to answer the first question, since it is simply his duty to affirm the presence of Eberth's bacillus when he has occasion to encounter it.

This bacillus is never met with in spring waters which have escaped contamination by dust or by liquids which have been used for washing the linen of sick or healthy persons. I

have never isolated it in the water of the Vanne drawn at Montrouge, nor in the water of the Dhuis. It is, on the contrary, very frequent in sewer water and in the water of the Seine. These species will probably be found in these waters until the evacuations of typhoid patients and the waters from public wash-houses cease to be carelessly carried into them.

It is not astonishing, then, to find Eberth's bacillus in river water: it would be surprising not to encounter it there. To mention an example: In the autopsies made upon persons who had succumbed to typhoid fever at l'Hôtel-Dieu it was customary to wash the intestines of the corpses by fitting them to a water tap in order to quickly dispose of all the contents; this facilitated the examination of the ulcerations of Peyer's plates; but where did these waste waters of the intestinal canal go? They flowed directly into the Seine by the city sewers. There is a cause, if I am not mistaken, of infection and of the propagation of typhoid fever by this water.

The Spirillum of Asiatic Cholera.

This microscopic species was discovered by Dr. Koch in the intestine of cholera patients. It is a comma-bacillus whose average length is 1.5 μ; its articulate parts are the result of division of a spirillum.

I have not yet had occasion to find this microbe in the water of Paris. I have made some artificial experiments for the purpose of studying the separation of this species mingled with the bacteria of Seine water. This separation is very difficult on account of the similarity presented by the colonies of spirilla with many ordinary colonies.

Spread upon plates of peptonized gelatin, the Spirillum choleræ asiaticæ first appears as a white point with irregular edge; then, when the colony grows, the gelatin is liquefied, forming a funnel-shaped depression if the colony is at the surface. Stab cultures give first a white line, which is converted at the end of three or four days into a canal of liquefied gelatin with funnel-shaped little cups. Upon gelose a yellowish mucilaginous bed is obtained, which has nothing characteristic. The form of the curved cell is more worthy of notice, but it, again, is common to the spirillum of Finkler and Prior, which liquefies gelatin more rapidly; and to many micro-organisms

which I have taken from sewer water, but which differ from these last spirilla in color; one of these is reddish and does not begin to liquefy the gelatin until after a period of eight days; the other produces white cultures upon gelatin, which it never liquefies.

The action of the cholera microbe upon animals is badly defined and produces contradictory effects; from my investigations I believe it would be hasty to draw any conclusion whatsoever from the results, which are sometimes positive, sometimes negative, and which are obtained by inoculating small mammiferous animals with the spirillum in question.

I repeat that I have never found Dr. Koch's spirillum in the river waters and spring waters which I have analyzed; moreover, spiral-shaped bacteria are excessively rare there; I have found in the Seine water only the Spirillum volutans; this may be successfully cultivated in almost pure water, or in that charged with one cubic centimetre of peptonized bouillon to the litre of sterilized water.

I do not believe it necessary to mention here the Staphylococcus pyogenes, which is frequently encountered not only in water, but also in the dust of the air; nor the pneumococcus, which is not commonly found in water, but which lives and multiplies in the mouths of healthy persons; nor the bacillus of tuberculosis, so difficult to determine in the free air, and which I have not been able to find in the sticky mud deposited upon porcelain bougies used for a long time in filtering the water of the Seine and of the canal of l'Ourcq; either the animals inoculated have remained very healthy or they have rapidly succumbed either to septicæmia or to purulent infection, but not to tuberculosis.

The septic species are very frequent in water, especially in dirty waters and privy waters; but it is sufficient to show that these species are fatal to animals to establish the fact that they are harmful to humanity. It is quite certain that their harmfulness depends upon the manner in which they enter the economy. I have been able to keep alive during several months Guinea-pigs and mice nourished with bread soaked in cultures of septic organisms, when they were killed in from twenty-four to forty-eight hours by the subcutaneous inoculation of some drops of these same bouillons; it is not, then, to my mind, legitimate to decide upon the morbid action of a species absorbed

by the digestive tract from the effects it causes by injection under the skin or into the peritoneal cavity. It is indeed known that the gastric juice destroys in a short time nearly all the virulent microbes observed up to the present time.

However, to conclude from these experiments, as some authors do, that infection through waters is a myth is, I believe, contrary to facts well established and recognized by the majority of physicians. On the other hand, it would be greatly exaggerating their injurious power to consider harmful waters which contain microbes capable of killing Guinea-pigs and rabbits by hypodermic inoculation.

As a conclusion to the preceding pages, I advise the analyst devoted to the microscopic study of water to be very circumspect in his affirmations touching the diagnosis of even the best-observed species, and not to hasten his conclusion of the pathogenesis of a water by the mere result of inoculations upon animals; for these inoculations may be fatal when they do not contain a known pathogenic species, and, on the contrary, they may be inoffensive for animals when they are harmful to man. If, in imitation of a practice long in use by myself, we nourish animals with the cultures of noxious microbes, it is generally found that the ingestion of these organisms is not deleterious. Man in his normal state offers a great resistance to pathogenic bacteria; but those cases should also be considered in which he has not yet become accustomed to infectious microbes when the immunity may be lost, or where the door may be opened to the infection against which he has long resisted. These facts of common observation justify the utility of micrographical analyses in relation to the bacterian species called pathogenic.

V. The Bacterian Flora.

It is certainly premature, considering the inconstant and little varied characteristics presented by bacteria, to attempt the study of a flora which can lead the inexperienced analyst to the determination of the species under consideration. Still, efforts should be made in this direction, and my attention has for a long time been fixed upon a similar work.

Dr. Flügge has given us some attempts of this nature based upon the color and form of the colonies developed in gelatin.

I do not share his views upon the practical utility of similar pictures, and, above all, I do not very clearly see what benefit a novice can draw from these restricted and poor classifications. To wish to insert in a restricted table the innumerable legions of micro-organisms found in nature—to divide them, for example, into microbes which liquefy and do not liquefy gelatin—is to relegate to a very inferior rank the characteristics which I, on the contrary, consider as most important. The reader will agree with me, I hope, that the characters drawn from the micrometric dimensions of the form of the microbe, when one does not know the various phases of its evolution cycle, are very precarious; that the ideas drawn from the color of the colonies, when that color varies from the day that the species becomes visible until several months after its growth, are almost useless for consideration; that the form of the colonies, so variable according to whether they are at the bottom or at the surface of the substratum, presents to the experimenter only very uncertain diagnostic points; that the property of liquefying the gelatin acquired or lost only keeps up an illusion of the analyst who considers this faculty as characteristic; finally, the reader will agree with me that all these characteristics are of very slight importance, and that a general flora should not be based upon such secondary properties.

The study of a bacterian flora useful for the consideration of micrographists will be arrived at, on the contrary, by classing the bacteria into general groups, in which the species which remain to be discovered will always find a place; as to the facts relating to fluidification, color, odor, to the form of colonies, deposits, etc., these should be reserved to aid in the distinction of species comprised in the same group.

The presentation of a flora which I will presently give has for its object only to show that this subject can be treated in a general way.

Analysis of a Bacterian Flora.

		Section.
1st. Species developing by contact with the oxygen of the air.	At 20° C.	A
	Only above 20° C.	B
	Only above 40° C.	C
2d. Species developing without the oxygen of the air.	At 20° C.	D
	Only above 20° C.	E
	Only above 40° C.	F

SECTION A.

Species developing at 20° C. by contact with oxygen of the air.

		Tribe.
Cocci	Pathogenic	I.
	Zymogenic	II.
	Saprogenic or common	III.
Bacilli	Pathogenic	IV.
	Zymogenic	V.
	Saprogenic or common	VI.
Spirilla	Pathogenic	VII.
	Zymogenic	VIII.
	Saprogenic or common	IX.
Other forms of micro-organisms	Pathogenic	X.
	Zymogenic	XI.
	Saprogenic or common	XII.

SECTION B.

Species developing only above 20° C. by contact with the oxygen of the air.

Etc. Etc.

Tribe I.

Pathogenic organisms in cocci developing at 20° C. in contact with the oxygen of the air.

				Group.
A. Organisms developing in nutritive gelatin, presenting	White or gray colonies		Liquefying	1
			Non-liquefying	2
	Yellow, yellowish, or greenish colonies.		Liquefying	3
			Non-liquefying	4
	Red or reddish colonies		Liquefying	5
			Non-liquefying	6
B. Organisms which will not develop in ordinary gelatin but will	1. In alkalinized gelatin, presenting	Whitish colonies	Liquefying	7
			Non-liquefying	8
		Yellowish colonies.	Liquefying	9
			Non-liquefying	10
		Reddish colonies	Liquefying	11
			Non-liquefying	12
	2. In acidified gelatin, presenting	Whitish colonies	Liquefying	13
			Non-liquefying	14
		Yellowish colonies.	Liquefying	15
			Non-liquefying	16
		Reddish colonies	Liquefying	17
			Non-liquefying	18
	3. In serum of blood			19
	4. In bouillons forming	Turbidity		20
		Elevated pellicle		21
		Diffuse pellicle		22
	5. In animal fluids sterilized by cold, forming	Turbidity		23
		Elevated pellicle		24
		Diffuse pellicle		25
	6. In vegetable fluids sterilized by cold, forming	Turbidity		26
		Elevated pellicle		27
		Diffuse pellicle		28
	7. In mineral liquids, forming	Turbidity		29
		Elevated pellicle		30
		Diffuse pellicle		31

Tribe II.

Zymogenic organisms in cocci developing at 20° C. in contact with the oxygen of the air.

Etc. Etc.

Group I.

Pathogenic organisms in cocci, developing at 20° C. in contact with the oxygen of the air and multiplying on ordinary nutrive gelatin, forming white colonies, liquefying.

The cultures placed under the microscope show the form of

- Monococcus.....
  - White colonies.
  - Gray colonies.
  - Rainbow-colored colonies.
- Diplococcus.....
  - Spherical colonies.
  - Discoid colonies.
  - Lamelliform colonies.
- Streptococcus....
  - Papillary colonies.
  - Colonies with prolongations.
  - Irregular colonies.
- Tetracoccus.....
  - Star-shaped colonies.
  - Mobile colonies.
  - Amœbiform colonies.
- Sarcinæ.....
  - Very opaque colonies.
  - Translucent colonies.
  - Colonies in concentric zones.

Group II.

Etc. Etc.

In the preceding flora the micro-organisms are divided into aerobes and anaerobes; bacteria which both are aerobic and anaerobic find a place in these two great divisions according to the modifications which their development sheltered from or in contact with the air presents.

The second characteristic made use of for the classification of microbes is the temperature at which they develop; most of them grow readily at 20° C., but some only develop between 30° and 40° C. and in their turn cease to grow when others have scarcely sufficient heat to multiply visibly; this is observed among the thermophile species, whose existence I was the first to mention.

These two characteristics are natural, as they are observed immediately after inoculation. The third is derived from the customary form which bacteria present at the first microscopic examination; it is not generally difficult at this moment to discover whether the developed species belongs to the micrococcus, bacillus, spirillum, streptothrix, cladothrix, etc.

The fourth characteristic, based upon the pathogenic or

zymogenic functions of the micro-organism, seems to me of most importance; the species to be examined is inoculated in living animals and introduced at the same time in sugared media, charged with urine or other fermentable substances. The pathogenesis of a species is determined from the action which the bacteria exercise toward the animals usually chosen as subjects (mice, Guinea-pigs, and rabbits).

The preceding outline is given for the sole purpose of serving as an example for the analyst; the pathogenesis has reference to the little animals under experiment, for it may happen that a species harmful to man may find its place in another section—a detail of little importance since we do not deal here with a botanical, methodical, and scientific classification of bacteria, but with a flora for the use of micrographists devoted to the study of the microscopic organisms of the air, earth, and water.

After the classification into tribes, I have subdivided the tribes into groups based upon the fertility and sterility which the different media present with regard to bacteria, the macroscopic characteristics of the color of the colonies, the liquefying properties of the species, their faculty of causing turbidity in the liquid media, pellicles spread upon the surface, deposits of colonies, etc.

Finally, after this grouping comes the determination of the species of the various groups, by means of the deeper study of the coccus, of the bacilli which present themselves isolated or associated in various ways. In this manner we approach very closely the individual; but there still exist, as much from the point of view of cultures as in relation to the zymogenic and pathogenic action, numerous particulars which might establish differences between varieties of microbes which are very much alike in aspect and properties.

When we find a name already known for bacteria first met with, it is important to compare all the characteristics with those that have been given by authors who have made them their careful study. It will often occur that we are kept in doubt upon the identity of a species found and described; this is not incomprehensible; for it is not always easy, even to him who has discovered a group of bacteria possessing the same biochemical and pathogenic functions, to distinguish them very clearly from each other. However, the analyst will

have performed his duty and cannot be reproached for having neglected the scrupulous research which this demands.

I have made a discouraging picture of the qualitative analysis of water, especially of the results to which it leads. I regret that I have not been able to say that this analysis is as simple as those which aim at the enumeration of germs found in the different media which surround us; but I owe it to my readers, I might almost say imitators (for I believe I have been one of the first to popularize this kind of research), to confess that which an experience of fifteen years has taught me. It has taught me: That qualitative analyses present numerous causes of illusion; that the diagnosis of bacteria offers very great difficulties; that we find microscopic species whose noxious action upon animals can in no way be denied and which seem perfectly harmless to populations who have used such waters for a long time. Finally, I have arrived at the conclusion that we can absolutely affirm the inoffensive character of a water from a bacterian point of view only when it contains but one species; this is not generally the case with waters which have been sterilized and left for some time in contact with the air.

Nevertheless, I think that bacteriological analyses are incontestably useful, that they should be numerous, constantly practised, with the development they permit, until there succeeds to the feeble light which science now throws upon bacteria a brighter one capable of illuminating upon all sides this science, which still remains enveloped in obscurity.

CHAPTER V.

GENERAL RESULTS OF THE MICROGRAPHICAL ANALYSIS OF WATER.

I. Statistical Results.

Waters submitted to quantitative enumeration may present a small or great number of bacteria, according to circumstances; it is then necessary to decide upon a comparison regarding quantity, with pure or impure water, and to establish a numerical scale where all waters, whatever may be their origin and their wealth in microbes, may find a place. In the sciences the necessity is felt of acting in such a way as to render intelligible to persons unacquainted with scientific research results which the simple statement of a figure would throw no light upon.

Thus, for example, besides the numerical designations of the thermometer, the meteorologist speaks of high temperature—of moderate, cold, and very cold temperatures; that which is permitted to this scientist is also permitted to the bacteriologist; and with more right, for the simple statement of the wealth of a water in bacteria by the cubic centimetre tells very little to persons not versed in micrography.

When I look at the numerous analytical results regarding waters during the past fifteen years, I am led to consider as very pure a natural water which contains a number of bacteria varying from ten to one hundred in the cubic centimetre, as pure water which contains from one hundred to one thousand; the following table clearly explains the terms of this indispensable if arbitrary statement:

	Bacteria to the Cubic Centimetre.
Water exceedingly pure, . .	0 to 10
Water very pure, . . .	10 to 100
Water pure, ...	100 to 1,000
Water mediocre, . . .	1,000 to 10,000
Water impure, ...	10,000 to 100,000
Water very impure, . .	100,000 and more

This scale, based upon the multiples of ten, is very easy to fix in the memory; and persons unacquainted with bacteriology can recall it with as much facility as the scale of the centigrade thermometer.

In applying it to the waters of Paris, whose average wealth in bacteria is as follows:

	Bacteria to the Cubic Centimetre.
Vanne,	800
Dhuis,	1,890
Seine at Ivry,	32,500
Marne at Saint-Maur,	36,300

we see that the water of the Vanne is comprised in the category of pure water, that of the Dhuis in the category of mediocre water; as to the waters of the Seine and Marne, they are impure from a quantitative point of view. These denominations, moreover, agree very well with the ideas held in Paris upon the quality of these various waters; but I must add that the number of microbes contained in spring and river water, being essentially variable, the same water may at certain seasons of the year receive the name of very pure, pure, or mediocre water. The Vanne, to choose a first example, is found in this condition:

YEAR 1890 (VANNE AT THE RESERVOIR OF MONTROUGE).

	Bacteria to the Cubic Centimetre.
Analysis of July 29th, 1890,	50
" February 25th, 1890,	100
" May 23d, 1890,	500
" June 6th, 1890,	1,000
" July 8th, 1890,	5,900
" August 1st, 1890,	14,000

Seine water also possesses a very inconstant micrographical composition:

1890 (SEINE AT THE WORKS OF IVRY).

	Bacteria to the Cubic Centimetre.
May 19th, 1890,	4,000
June 2d, 1890,	12,000
March 3d, 1890,	40,000
January 6th, 1890,	128,000

A river water may, then, according to the time at which it is analyzed, be mediocre, impure, or very impure.

The waters of the Dhuis, Marne, the canal of Ourcq, also well waters and those of drains, show a variable composition.

However, this is an interesting side of statistics of microbes, that the variations in the wealth of natural water in bacteria show themselves periodically at some special time in the year. Although the monthly averages exhibit great fluctuations in the number of bacteria, I think it will be interesting to reproduce the following tables which will give a very clear idea of the phenomena with which we are occupied. In these tables the averages attributed to each month are the result of monthly averages observed from 1887 to 1890 inclusive:

SPRING WATER (GENERAL MONTHLY AVERAGES).

Month.	Bacteria to the Cubic Centimetre. Vanne.	Dhuis.
January,	400	2,700
February,	1,625	4,500
March,	1,560	2,350
April,	860	3,930
May,	720	1,680
June,	590	765
July,	865	930
August,	985	500
September,	465	480
October,	495	985
November,	495	2,175
December,	525	1,710
Annual average,	800	1,890

SPRING WATER (GENERAL AVERAGES OF SEASONS).

Season.	Bacteria to the Cubic Centimetre. Vanne.	Dhuis.
Winter,	1,200	3,180
Spring,	720	2,125
Summer,	770	635
Autumn,	505	1,605
Annual average,	800	1,890

As inspection of the figures of the two preceding tables will prove, spring water is most impure in the first quarter of the year—that is, in winter; then the purity of this water begins to increase; it is at its maximum in summer and sometimes in autumn, when showers are not too frequent during this season.

The two following tables relate to the average monthly wealth of river and canal waters distributed at Paris:

River Waters (General Monthly Averages).

	Bacteria to the Cubic Centimetre.		
Month.	Seine at Ivry.	Marne at St. Maur.	Ourcq.
January,	52,670	75,960	143,370
February,	43,120	58,120	63,720
March,	34,710	57,750	47,780
April,	38,640	16,310	22,660
May,	12,930	12,890	29,340
June,	28,150	14,270	7,340
July,	14,130	10,450	7,730
August,	6,780	13,570	8,520
September,	20,220	6,410	80,070
October,	22,350	11,860	12,560
November,	37,720	95,590	135,700
December,	78,950	62,470	153,200
Annual averages,	32,530	36,305	53,330

River Waters (General Averages by Season).

	Bacteria to the Cubic Centimetre.		
Season.	Seine at Ivry.	Marne at St. Maur.	Ourcq.
Winter,	43,500	63,940	84,955
Spring,	26,570	14,490	19,780
Summer,	13,710	10,140	8,105
Autumn,	46,340	56,640	100,485
Annual average,	32,530	36,305	53,330

As regards river and canal waters, the numerous experiments I have made undeniably establish that these waters are most pure in summer, that is, during the quarter comprising July, August, and September. The quarters in which the

waters are most impure are the first quarter of the year (winter) and the last (autumn). No relation, then, exists between the temperature of the water and its wealth in micro-organisms. In summer, when the water is most pure, it has a degree of heat above 20° C.; in winter, when it is richest in bacteria, the degree of heat fluctuates between 0° C. and 5° C.

This result appears paradoxical when it is admitted that temperature is an agent which greatly favors the increase of microbes; this fact, abormal as it seems, we must accept, since it is furnished by experience; but we have the right to seek its rational explanation.

In running waters the multiplication of bacteria is accomplished with difficulty; when a river or spring water shows a sudden increase in micro-organisms, we may be certain that this is not due to an elevation of temperature, but to accidental contamination, such as is observed when, after abundant rains, waters washed from the soil augment the currents of water and produce the increase.

Analysis directly establishes, moreover, that river waters are so much more impure in proportion as their level is raised above low-water mark.

In order to explain bacterian increases in spring waters, drainage of subterranean forms of water, it must be admitted that the natural filters, which are usually satisfactory, purify waters coming from the surface of the soil; they become insufficient in times of rain; we may also suppose, in addition to this sufficient filtering power of telluric beds, the direct contamination of springs and wells crossing fissures or other separations of continuity. This hypothesis is justified from the analytical results furnished by artesian wells whose temperature does not exceed 30° to 40° C. and which vary very little. The diagram Fig. 19 indicates very clearly the influence of meteoric showers upon the richness of spring water in bacteria.

In this diagram the shaded spaces bordered by an interrupted line represent the average richness in microbes of the Vanne during the year 1889; the continuous broad curve, the temperature of this water drawn from the reservoir of Montrouge; finally, the rectangular shaded spaces above indicate the heights of rainfall during the same weeks in the Parisian region.

It will readily be seen in this diagram that the increase of bacteria in Vanne water received at Paris corresponds to all considerable rainfalls. In summer, this phenomenon is less apparent, because the showers evaporate rapidly or are easily absorbed by the dry earth; but in spring and autumn the soil remains moist and is soaked to excess.

These examples of the variability of the micrographic composition of water show that a single analysis of a given water cannot definitely establish its average richness in microbes:

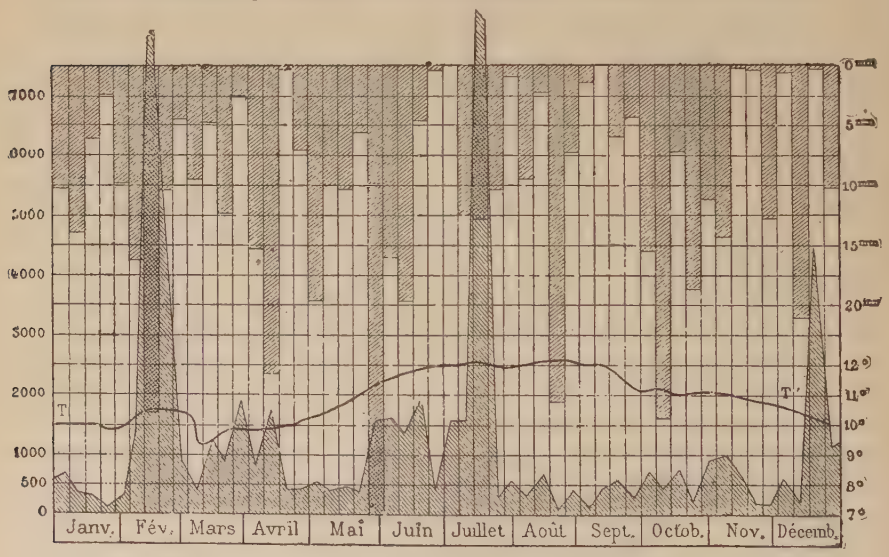

FIG. 19.*—THE RELATION OF THE PURITY, IN BACTERIA, OF SPRING WATERS TO THE FALL OF RAIN.

indeed, an analysis made in summer will generally give a minimum number of germs; during the winter and the humid periods of spring and autumn, on the contrary, one will obtain a maximum number. I say humid, and not icy, periods, for it will be observed that during long-continued snows and cold, when the temperature is below 0° C., spring water acquires a very great purity.

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* By mistake, the diagram (Fig. 19) indicates an increase beyond 8,000 bacteria during the third week of July, 1889. The number of germs observed during this week was found to be exactly 1,025 germs to the cubic centimetre; that is, less than the number mentioned for the two weeks preceding.

Many other interesting facts are brought to light by the quantitative analysis of water; we rely upon it in determining the filtering power of soils; and in this relation I wish to report a very encouraging experiment made by M. Lefort, chief engineer at Nantes, who intrusted to me the determination of the number of bacteria contained in the Loire, and in the water of a trial pit hollowed at the depths of this river surrounded by a bed of sand 12 m. thick.

Experiment I., March 3d, 1890.—Water from the Loire, taken in the neighborhood of the trial pit, shows an average of 9,530 bacteria to the cubic centimetre. The water of the trial pit shows only 73 to the cubic centimetre.

Here are also the detail of these analyses, which seem to demonstrate that in the absence of spring water it is easy to produce, by filtration, a drinking water almost as poor in bacteria as that issuing from the earth:

Water from the Trial Pits of the Loire.

	Bacteria to the Cubic Centimetre.
Specimen 1, ...	55.00
Specimen 2, ...	82.00
Average, ...	68.5

Water of the Loire.

	Bacteria to the Cubic Centimetre.
Specimen 3, ...	9,060
Specimen 4, ...	10,550
Average, ...	9,805

A simple comparison of these two numbers indicates that the water of the trial pit is 140 times purer than the water of the Loire.

Experiment II.—Another analysis, made September 15th, 1890, with these same waters, furnished the following figures:

Water of Trial Pits.

	Bacteria to the Cubic Centimetre.
Specimen No. 1, ...	124
Specimen No. 1 *bis*, ...	140
Average, ...	132

WATER OF THE LOIRE.

	Bacteria to the Cubic Centimetre.
Specimen No. 2, ...	25,250
Specimen No. 2 *bis*, ...	22,750
Average, ...	24,000

These results deserve to be known; for although one may have told of the insufficiency of the filtering power of sand, and of experiments little to be compared with the results of natural filters, I believe the analyses of Lefort will permit many municipalities possessing feeble resources to procure for themselves, at a relatively low cost, water presenting all desired safeguards from a bacteriological point of view—in any case, as little charged with germs as are the waters brought at great expense from localities very remote from urban centres.

It is by the aid of qualitative analysis that the certainty has been established that sewer water spread upon the ground reaches the streams in a state of great purity when the quantity of water poured upon the ground intended for the purification of the sewer water is moderate, and when the drains remain free from all accidental contamination.

For two years I have periodically analyzed the waters of the drain of Clichy, before their entrance into the *case de Clichy*, and after their exit. The *case* called *de Clichy* which had been placed in the laboratory of Clichy by M. Durand-Clay, is composed of a bed of earth two metres thick, representing successively, in quality and quantity, the earth of Gennevilliers irrigated by the sewer water. The water of the Clichy drain brought to the surface of the case showed about 20,000,000 bacteria to the cubic centimetre; at its exit the water showed only 21,700 bacteria on an average—that is, it had left, in its rapid course through the bed of 2 m. of earth, 999 of the 1,000 bacteria which it contained.

These experiments, made on a small scale at the laboratory of Clichy, have been repeated on a larger one upon the peninsula of Gennevilliers. It is known that the sewer water of Paris is utilized daily for watering this plain, and that the water which was filtered through the earth returns to the Seine

by four drains—the drains of Asnières, Argenteuil, Garenne, and Epinay—whose waters contain micro-organisms in the following quantities:

General Averages of Microbes in the Drains of Gennevilliers.

	Bacteria to the Cubic Centimetre.
Drain of Asnières,	410
Drain of Argenteuil,	6,745
Drain of Garenne,	7,945
Drain of Epinay,	14,795
General average,	7,475

The sewer waters of the city of Paris, which have a general average of 13,800,000 bacteria to the cubic centimetre, filtered through the soil of Gennevilliers, return to the Seine 1,800 times purer.

Seven thousand four hundred and seventy-five bacteria to the cubic centimetre of water represent a richness in microbes inferior to that of many streams of water; it is then rational to conclude that the diffusion of the sewer water upon the ground is a very powerful and efficacious means of purification. Where the drains run into the Seine, the wealth of this river water in microbes is as high as 200,000 to the cubic centimetre.

I will not speak of the water of the drain of Asnières being twice as pure as that of the Vanne drawn at the reservoir of Montrouge, but I will remark that if a very great difference exist between the microbian wealth of the waters of these various drains, it is probably the result either of unequal filtering power due to the nature of the soil or of some accidental contamination, which could certainly be avoided by altering the drains.

Since we can purify sewer water by means of the soil, and render it almost as pure as spring water, it is natural to believe that waters of streams infinitely less charged with bacteria than sewer water, directed through a sufficiently thick bed of earth, might also be purified, and furnish water almost identical with the purest spring water in the amount of mi-

crobes. In the preceding pages it has been seen how Chief Engineer Lefort knew to profit by the sands of the Loire for considerably purifying the waters of this river; but long before these experiments, to cite a few examples, the cities of Perpignan, Dinan, Toulouse, Mâcon, etc., had resorted to filtration through the soil in order to procure water but slightly charged with bacteria.

The city of Toulouse, especially, has for a long time used the water of the Garonne, collected in different pits hollowed in that part of the banks of this stream called the *prairie des filters;* the water of the Garonne, charged with 10,000 to 20,000 bacteria to the cubic centimetre, has shown in my analyses 675 microbes to the cubic centimetre. This result proves, it is true, that filtration is far from perfect; but it shows nevertheless that it works in a very appreciable manner.

The city of Mâcon, which also derives a part of its drinking water from the Saône, obtains, through the pits hollowed at the borders of this river, a water whose microbian purity approaches that of spring water, and which I have found to contain about 350 bacteria to the cubic centimetre.

Again, at Toulouse, at Moulon du Château-Narbonnais, where it was thought to utilize the infiltrations of the Garonne produced in the island of Ramier, analysis showed 1,470 bacteria to the cubic centimetre. In my opinion, this purification is insufficient.

The results obtained by the city of Perpignan in its experiments for the purification of the water of the Têt are much more remarkable; they have furnished a filtered water, beautifully clear, containing about 270 bacteria to the cubic centimetre. On the other hand, the experiments made by the city of Dinan for purifying the waste waters of the soil through the so-called draining-grounds of Cassepot and of Chêne-Pichard are much less encouraging; the drain water of Cassepot, drawn into the basin of that name, showed 730 bacteria to the cubic centimetre; the water of the drains of Chêne-Pichard 1,300 to the cubic centimetre.

Nothing assuredly is equal to the use of spring water which analysis has demonstrated very slightly charged with bacteria, whenever that is possible: it is these waters which should be used for drink by populations: nevertheless, in coun-

tries where spring water is rare or altogether lacking we are obliged to remedy this misfortune through practical means. For my part, I believe that purification by the soil will lead in the near future to the production of waters of irreproachable purity; but for this, it will be necessary carefully to construct filters, which nature does not always present of sufficient security; it will be necessary to lead the filtered waters through perfected drains or through covered avenues free from all reproach.

Should we still wish another example of the filtering power of earth, we will find it in the neighborhood of Paris at the works of Saint-Maur-les-Fosses, where the water of the Marne is led through a filled trench; it slowly crosses this and furnishes the water of the *drain de Saint-Maur.* This water which I have analyzed for three years, comparing it with that of the Marne, possesses a purity about equal to the water of the Dhuis drawn at the basin of Ménilmontant.

MONTHLY AVERAGES OF THE WATERS.

	Bacteria to the Cubic Centimetre.		
Month.	Marne.	Dhuis.	Drain of St. Maur.
January, . . .	75,960	2,695	6,435
February, . . .	58,120	4,500	7,230
March, ...	57,750	2,350	7,230
April, ...	16,310	3,930	1,240
May, ...	12,890	1,680	1,075
June, ...	14,270	765	1,110
July, ...	10,450	930	585
August, ...	13,570	500	1,115
September, . . .	6,410	480	660
October, ...	11,860	935	795
November, . . .	95,590	2,175	3,160
December, . . .	62,470	1,710	3,160
Annual average, .	36,300	1,890	1,950

In these experiments the water of the Dhuis was drawn outside of the fortifications of Paris—that is, above the reservoir of Ménilmontant; that of the drain of Saint-Maur, in the receiving conduit of this water at the works of Saint-Maur.

I need not remark that the water of the drain of Saint-Maur has a composition approaching that of spring water; also the Dhuis; nor that the passage of the Marne water across the trench of Saint-Maur, filled with filtering materials, suffices to take from the waters of the Marne seventeen bacteria out of eighteen.

Quantitative analysis serves also to establish the degree of infection which may result from certain manufactories (starch works, scalding houses, dye works, laundries) and of various operations which, like the steeping of hemp, the tanning of skins, washing of linen, and the running over of sewer waters into the currents of water, are justly considered as causes of dangerous infections. Upon the infection of the Seine in its short journey from the works of Port-à-l'Anglais (confluence of the Seine and Marne) to the bridge of Alma, otherwise called the hydraulic works of Chaillot, I can furnish a very instructive document, based upon three years of weekly analyses; this proof, here reproduced, gives the general average wealth in bacteria, for each month of the year, of Seine water drawn from the works of Ivry, the works of Austerlitz, and the works of Chaillot:

MONTHLY AVERAGE OF BACTERIA IN THE WATERS OF THE SEINE.

Month.	Bacteria to the Cubic Centimetre at the Works of—		
	Ivry.	Austerlitz.	Chaillot.
January,	52,670	41,020	85,350
February,	43,620	59,590	107,590
March,	34,710	46,070	80,920
April,	38,640	29,020	86,760
May,	12,930	30,960	37,920
June,	28,150	40,340	90,860
July,	14,130	26,830	84,520
August,	6,780	21,910	121,430
September,	20,220	76,170	227,400
October,	22,350	42,390	143,120
November,	37,720	45,690	144,200
December,	78,590	73,820	129,900
Average,	32,530	44,490	111,660

AVERAGE OF SEINE WATER, BY SEASONS.

Season.	Bacteria to the Cubic Centimetre at the Works of— Ivry.	Austerlitz.	Chaillot.
Winter, . . .	43,500	48,890	91,285
Spring, . . .	26,570	33,440	71,845
Summer, . . .	13,710	41,635	144,250
Autumn, . . .	46,340	53,965	139,070
Annual average,	32,530	44,490	111,660

These figures show that, if the impurity of Seine water becomes less in crossing from the works of Ivry to the works of Austerlitz, from Austerlitz to the bridge of Alma the water of the Seine acquires a number of bacteria more than triple that which it contains at the works of Ivry; this fact is readily explained by the running of the dirty waters of the sewers of the Isle of la Cité and of Saint-Louis into the Seine, and by the presence of numerous laundry-boats, which infest the waters of this stream with numerous organisms of every species. Indeed, it is known that in public wash-houses the water which serves for soaking the linen is charged with a considerable quantity of microbes: I have found that Seine water, used in this work, showing primarily 10,000 bacteria to the cubic centimetre, contains after the process of soakage 20,000,000 bacteria to the same volume.

I have not enumerated in detail the very varied ways in which the quantitative analysis of water may be applied; this division of bacteriology is full of instruction; it may, with absolutely mathematical accuracy, lead the experimenter, who uses it with judgment, to the solution of a host of problems connected chiefly with the general hygiene of cities and countries.

II. THE AUTO-INFECTION OF WATER.

In a preceding chapter I called attention to the rapid increase of bacteria in spring water left to itself; I must now add that this phenomenon, so marked in waters which contain few microbes, is much less observable in water moving about for some time upon the surface of the ground.

Vanne water, containing 150 bacteria to the cubic centi-

metre, kept for only twenty-four hours at a temperature of 20° C. may then often contain 30,000 to 40,000 bacteria to the cubic centimetre; while the water of the Ourcq left under the same conditions is not sensibly altered. Seine water, according to its degree of purity, increases in bacteria in proportions varying from 1 to 10. Chemical analysis proves also that the nutritive elements, carbon, nitrogen, oxygen, and earthy salts, exist in considerably larger proportion in waters called impure than in spring water; the confirmation of this curious fact has been the object of some long and difficult researches of mine.

In order to obtain comparable results in the study of waters abandoned to themselves, I have taken care to keep them at an almost invariable temperature of 29° to 30° C.; then I have inoculated each day, and at longer periods, the bacteria of the waters thus placed in Arsonval's incubator.

First I determined the nature of the proliferations of which spring waters of various origins become the seat; the diagram Fig. 20 represents the curves obtained with these waters. The figures of the line of abscissas designate the number of days of incubation, the figures of the line of ordonates the hundreds of thousands of microbes counted to the cubic centimetre.

These waters, so pure at the moment of drawing, showed rapid bacterian increase, passing within the first days to a maximum (sometimes a million of bacteria to the cubic centimetre), which is never observed in other waters. The curve, arrived at its summit, turns back rapidly toward the line of abscissas, which it then very slowly approaches and with which it has a tendency to blend to the end of a number of years, which I have not determined.

The oldest Vanne water which I have at my disposal dates from October, 1878; after having shown, at the moment of its drawing from the basin of Montrouge, 470 bacteria to the cubic centimetre, and having passed through increases analogous to those represented in diagram Fig. 20, it contains today only 0.2 bacteria to the cubic centimetre, or 2,350 times less than at the moment it was drawn. By analogy, I must admit that the waters of the Dhuis and of Saint-Laurent—the first represented in the same diagram by a curved line in dashes, the second by a dotted curved line—also drain water and all those which have been submitted to purification

through the earth, possess the faculty of successively losing their bacteria, and are impoverished to such an extent as to contain, after ten to twelve years, no more than one hundred to the litre.

Spring water appears to me to be characterized by the faculty it possesses, first, of rapidly becoming charged with

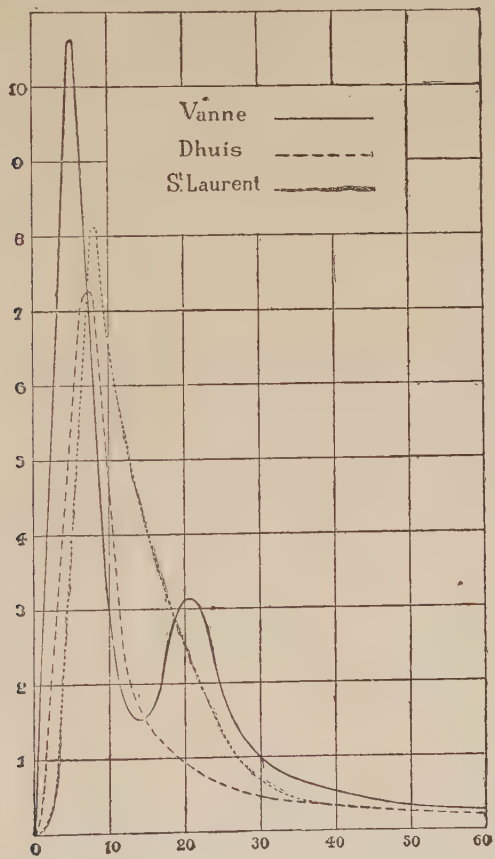

FIG. 20.—AUTO-INFECTIONS OBSERVED IN SPRING WATERS KEPT AT 30° C.

micro-organisms, then of easily losing them as it grows old. Is it the same with river water, canal water, and waters in general whose number of bacteria is always high at the moment of analysis? The diagram Fig. 21 answers this question; it shows that the increase in growth of bacteria becomes slower as the water becomes more impure.

Seine water drawn at Ivry during a summer, inferior in richness to the annual average, may show quite a considerable increase of germs; in this respect it has a manifest tendency to behave like spring water; but as the increases unexpectedly come, as its number of microbes reaches at immediate analysis 20,000 and 30,000 bacteria to the cubic centimetre,

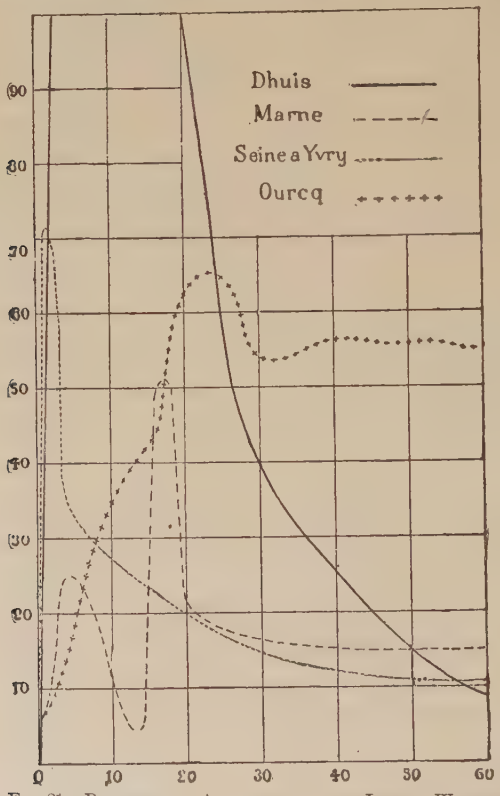

FIG. 21.—PROGRESS OF AUTO-INFECTION IN IMPURE WATERS.

this faculty of spontaneous infection disappears, and this impure water cannot become the seat of rapid and sudden microbian increase.

The diagram Fig. 21 presents some examples of increases of bacteria observed in river waters left to themselves at the almost invariable temperature of 30° C. In this diagram the figures of the line of abscissas indicate the days during which the water had been under observation; the figures of the line

of ordonates indicate the units of a thousand of bacteria to the cubic centimetre found in this water.

The curved line formed of dashes, furnished by the Marne water, presents a double infection, as is sometimes encountered in waters subjected to auto-infection. The water of Ivry, relatively pure, gives a curved line, represented by dots, somewhat of the form of those of spring water, except that the habitual increase is higher. But I wish especially to attract the attention of the reader to the curve, formed of a series of little crosses, which represents the progress of infection in the water of the Ourcq canal. This water, properly aerated, exposed to a constant temperature of 30° C., reveals a marked increase in the number of its bacteria after twenty days of incubation, from 8,000 to 60,000 bacteria to the cubic centimetre; then decreased very little; and then maintained upon an elevated plateau without presenting any considerable decrease. After six months, a year, and more of waiting, the curve continues indefinitely on a level. Seine water, at the end of a relatively shorter time, offers, on the contrary, a curve very visibly declined; but after some months, this decrease becomes slower and slower; and at the close of ten or twelve years, the number of microbes in Seine water is still equal to a third and even half of that which it was at the moment of drawing.

To resume:

A rapid but transient bacterian infection characterizes natural waters issuing from the earth; a slow and tenacious bacterian infection characterizes waters microscopically impure. These observations, which I have always seen confirmed by experience, enables us to discover the origin of a water, whatever age it has at the time of examination.

The increase of bacteria in waters left to themselves is not solely due to the excessive development of a single organism; many bacteria, it is true, have a particular tendency to multiply rapidly in water; but it must be recognized that by the side of these many other species likewise exist who contribute to a great extent to the observed increase.

It is not less interesting to point out the fragility of various organisms contained in spring water, which, after being 10 to the cubic centimetre, are 1,000 the next day, 10,000 the next after that, then die and disappear as rapidly as they

have multiplied. I have counted among these microbes, bacteria, bacilli, micrococci, which, after having lived this ephemeral existence, have vanished without leaving germs capable of perpetuating them.

We approach now a subject of the utmost importance.

The species which develop most in spring waters show, after a brief appearance, an incapacity for multiplying; in other words, these bacteria, placed in water which they already infect, not only remain inert, but often die very rapidly. In short, the water which has, so to speak, been ill with such or such a bacteria, has acquired a certain immunity toward it; this it is in the power of the experimenter to destroy in a few instants, but it may resist for more than ten or twelve years.

It seems to me that this fact should be of very great interest to the hygienist; for it proves that many waters are not only incapable of favoring the multiplication of such organisms, but that they are an indifferent or even deadly medium for them. Shall we not find in this fact the key to the immunity which certain regions present to the establishment of such epidemics for whose germ the water is probably a vehicle? Hence we will understand how useful it is to record whether such an infectious organism is capable of growing in such and such a spring water or in a particular stream.

From my researches, the waters which are most nutritive with respect to known pathogenic organisms, are the new waters; that is, those which are but slightly charged with bacteria and which have never been the seat of the sudden growths mentioned. River waters containing many microbes, dirty water, and sewer water are relatively very slightly nutritive with respect to the typhoid bacillus, for example. I conclude from this that epidemics are so much more to be dreaded when they are transmitted by water of great bacterian purity—by a new water which permits pathogenic bacilli to multiply in great number without difficulty.

In impure waters—in those which have nourished many generations of different organisms—the bacteria have secreted, during their existence, diastatic poisons which are at least opposed to the multiplication of pathogenic species if these diastases do not actually rapidly kill them.

These diastatic products can be isolated perfectly; we will see, a little further on, the processes which easily enable us to obtain and study them.

A water incapable of nourishing pathogenic organisms acquires anew the faculty of favoring their development when it is freed of its bacterian poisons. In order to kill these diastatic products, it is sufficient to heat the water to a temperature of 100° C. for some minutes; the water again becomes fertile for pathogenic organisms. It is different if, in place of heating the water, it is freed from ordinary bacteria by cold filtration. It is well established, then, that it is not a battle between bacteria, such as the battle between the protozoa, where the stronger devour the weaker: it is the bactericidal action or the unfavorable nature of the medium which helps or opposes the development of such and such bacteria. These experiments establish the certainty that, in waters classed as impure, it is neither the lack of mineral or organic elements which is opposed to the growths just pointed out, but the presence of non-organized bacterian poisons which have been diffused there for a greater or lesser period.

In order to isolate these poisons which confer immunity toward certain organisms, not only upon the waters which are spontaneously charged with them, but also in the waters in which they are transported, I formerly used the vacuum. The water turned into a porcelain capsule, cleaned and sterilized, was placed upon a crystallisoir containing calcic chloride, placed under a bell-glass, where the vacuum was produced. Under these conditions, the evaporation of the liquid is very slow and takes several months, since it cannot easily be accomplished sheltered from the dusts of the air—this being very important. I have substituted for this method a second, which gives much more satisfactory results. In an apparatus about the shape of that represented by Fig. 22 is placed a crystallisoir of glass, well washed, first with fuming nitric acid, then with an ammoniacal water, and then with ordinary distilled water; this sterilized crystallizer is placed under a bell-jar provided with three tubes; one of the lateral tubes leads the water purged of germs by cold sterilization into the crystallisoir, the opposite lateral tube leads the water condensed by a little flask situated above the crystallizer and fastened in the upper tubular of the bell-glass to the exterior.

Thus it is easy to understand how we can conduct, sheltered from dust, the water deprived of microbes into the crystallisoir, and withdraw it by means of condensation at the temperature of 30° to 35° C.; in order to carry on this operation in an irreproachable manner, the bell-jar must adhere exactly to a ground, tallowed plate of glass.

By means of distillation at low temperature, we succeed in concentrating under a very small volume the soluble, non-volatile products secreted by the bacteria scattered in eight to ten litres of water; thus is acquired the certainty that these bacterian products are poisonous to the animal species. Let a weak dose be introduced into waters which are very nutritive for bacteria, they will impede the development of a large number of species.

The diastatic products gathered in the crystallizer are then taken up again by a water microscopically barren, and are finally led, after a second filtration through porcelain, into a sterilized vessel where they will keep for a very long time.

I am far from having finished the study of the soluble products secreted by bacteria in water, as well as the curious and delicate experiments that I commenced several years ago; I hope in the near future to write at length upon this subject. For the present I will bring out only one fact worthy of the attention of hygienists; that is, that very pure water left to itself is filled, at the end of a short time, not only with a very large number of bacteria, but with soluble products which may give to it poisonous qualities. The result of my researches is well calculated to proscribe, in cities where this still exists, the storing of spring water in reservoirs, generally metallic, where it is sometimes kept for a long time before being used.

Microscopically Barren Water.—I give this name to a water incapable of nourishing bacteria.

In order to prepare this water in considerable quantity, I use the apparatus represented by Fig. 22; it is composed of a bell-jar, tubulated at its upper part and laterally. Into the upper opening is fastened a flask B, in which circulates a current of cold water, in order to effect a condensation of dew in the lower part of the flask. Below this condensing apparatus is placed a receiving flask F, placed at the centre of a crystallisoir with a double concentric wall VV; and through the

funnel E of the lateral opening into the bell-jar ordinary distilled water is conducted passing into the annular part of this crystallisoir. The bell-jar arranged upon a movable plate, slightly vaselined, is placed on a stove at 30° to 35° C.

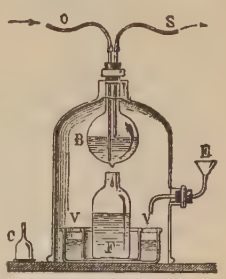

Fig. 22.—Apparatus for Distilling of Water at a Low Temperature.

The water of the annular part of the crystallisoir is successively led into the condensing apparatus B, and thence into the flask F, which at the close of the operation is covered with the movable stopper C.

At the end of some weeks, the flask is full of water distilled at low temperature, sheltered from atmospheric dust and accidental impurities which occur in water distilled by means of the ordinary stills. This water, free from atmospheric dust, contains as a solid foreign element, only the silicates: this it derives from the glass; it contains also the gaseous elements of the atmosphere, ammonia and carbonic acid from the air.

This water is barren in the sense that it cannot nourish bacteria.

Experiment I.—One hundred c.c. of this microscopically barren water are left for fifteen days at a temperature of 30° C.; at the end of this time 10 c.c. of this liquid are distributed in doses of 1 gram, in ten specimens of beef bouillon; only one of these specimens contained a micrococcus in a pure state.

Experiment II.—Thirty c.c. of the same water were left in a stove for a month and a half, then distributed among fifteen specimens of bouillon; one of these, some days later, showed a simple mycelium of mould.

Experiment III.—One hundred and twenty c.c. of a new specimen of microscopically barren water were distributed in nearly equal parts into sixty Freudenreich flasks, half full of peptonized bouillon; after one month's incubation in the stove, two specimens were found altered, the one by a yellowish micrococcus, the other by mould.

Only the most ordinary precautions were taken in these experiments to prevent the germs of the air from contaminating this water distilled at low temperature and collected in

perfectly sterilized vessels. In the following experiments I purposely introduced, into different specimens of the same water, the organisms of a certain quantity of atmospheric dust, in order to know what becomes of them after contact with this liquid.

Experiment I.—Twenty c.c. of water distilled at 30° C., not sterilized, were contaminated with the dust of 75 litres of air taken in the Place Saint-Gervais; this water, submitted to immediate enumeration, showed sixteen microscopic organisms to the cubic centimetre; forty-eight hours after, a second enumeration showed five micro-organisms; five days later, 1 gram of this water was barren, and at the end of a month 5 grams of this water remained perfectly sterilized.

Experiment II.—Another specimen of 20 c.c. of distilled water received the dust of 100 litres of air from my laboratory, and in successive enumerations furnished the following results:

	Bacteria to the Cubic Centimetre.
First enmueration, immediate, . . .	45.0
Second enumeration, six days later, . .	22.0
Third enumeration, nineteen days later, .	1.5

Thirty-four days later, 4 c.c. of water were absolutely barren.

Experiment III.—Three hundred c.c. of water distilled at 30° C. and microscopically barren received the dust of 1,650 litres of laboratory air:

	Bacteria to the Cubic Centimetre.
At immediate enumeration, ...	75.0
Second enumeration, six days later, . . .	7.0
Third enumeration, sixteen days later, . .	1.5
Fourth enumeration, twenty-seven days later,	1.5

From this moment on, the micrographic composition of the water did not change. It is, as may be seen, very interesting to prove that bacteria not only do not develop in water distilled at 30° C., but that, for the most part, they die in it.

As counter-experiments, my pupil M. Wada investigated what becomes of the bacteria of atmospheric dust when they are placed in ordinary sterilized water.

Experiment IV.—The dust of 20 litres of air from the Place Saint-Gervais, confined under a wad of spun glass, were

planted June 27th, 1890, in 30 c.c. of Ourcq water sterilized at 110° C.

RESULTS.

	Bacteria to the Cubic Centimetre.
27th June, 1890, experiment at outset,	6.5
4th July, 1890, 7 days after, . .	750,000.0
7th July, 1809, 10 days after, . .	900,000.0
28th July, 1890, 31 days after, . .	1,675,000.0
27th Sept., 1890, 90 days after, . .	62,500.0
24th Oct., 1890, 119 days after, . .	86,750.0
26th March, 1891, 272 days after, .	48.000.0

It is seen that the increase of atmospheric bacteria in ordinary sterilized water is exceedingly rapid. After a maximum of growth, the number of bacteria immediately begins to diminish like that of bacteria in water submitted to auto-infection.

Experiment V.—Another experiment was made by M. Wada with the dust of 10 litres of air, also taken from Saint-Gervais.

RESULTS.

	Bacteria to the Cubic Centimetre.
1st August, 1890, at the beginning, .	14.75
8th Sept., 1890, 40 days after, . .	5,500,000.00
27th Sept., 1890, 58 days after, . .	4,000,000.00
24th Oct., 1890, 85 days after, . .	4,125,000.00
26th March, 1891, 238 days after, .	6,720,000.00

These last two experiments suffice to show that if atmospheric bacteria are not developed in water distilled at 30° C., it is because it does not contain the necessary materials for their increase and nouirshment.

Meade-Bolton has said that certain micrococci and bacteria of water are able to develop in great numbers in perfectly pure distilled water, and as perfectly pure distilled water he gives as an example the water redistilled in glass apparatuses. I do not believe chemistry has yet succeeded in finding means to obtain perfectly pure distilled water: the best which is offered to micrographists always contain silicates, carbonic acid, ammonia, oxygen, and dissolved hydrogen; if these different elements can support the life of bacteria, microscopi-

cally barren water does not exist. If, on the contrary, these elements are incapable of favoring the development of microbes, aquatic and other micrococci will never become developed in it.

In Chapter II. I have given some examples which enlighten us upon the destiny of microbes of water introduced into microscopically barren water; I will not quote any other of the various experiments I have made in this direction with numerous microscopic organisms which I have been able to isolate from the air and soil; with the exception of the occasional growth of the mycelium, which possesses the faculty common to certain mildews of drawing nutritive elements where all other organisms remain inert or are killed, I have not been able to find the bacterium which could develop in water distilled at 30° C.: until proof to the contrary is offered, I shall consider water prepared by the process I have just described as micrographically barren with regard to bacteria.

From these various considerations, it results that one should demand from the micrographic analyst the determination not only of the number and nature of the bacteria, but the determination also of the quality and quantity of soluble ferments belonging to the generations of microbes which have succeeded each other in a given water. These are doubtless not without action upon the phenomena of digestion, perhaps upon the greater or lesser receptivity found by bacteria in the intestinal tube; before the studies of this nature may be completed, hygiene should proscribe the alimentation, not only of waters which are strongly charged with bacteria, but those which serve as a medium of culture for these micro-organisms, such as stagnant cistern or spring water; for it is almost positive that bacteria, inoffensive by themselves, may, through the work of fermentation, and ulterior secretion, take away from drinking waters the qualities they possessed when emerging from the soil.

III. Results of Qualitative Analysis.

According to his mission, the bacteriologist may have to search for many pathogenic organisms whose study is already much advanced, and to which one attributes the introduction of various diseases (typhoid fever, cholera, carbuncle, tetanus,

etc.). In this case, the general analysis becomes particular, and thus becomes considerably simplified; one has no longer to answer that vague question which habitually brings justifiable terror to the analyst, Is this water, or is it not, harmful to the human race? It suffices, then, simply to know whether the water sent to the laboratory contains the germs or the microbes which are specified.

It would always be easy for the operator to respond to these specific demands if the discovery of pathogenic organisms in waters were not often surrounded by serious difficulties; not that it would be difficult, for instance, to prove the presence of Eberth's bacillus in water, from the published scientific works of Chantemesse, Widal, and Vincent, when the appearance of this bacillus corresponds to the characters of the cultures of this micro-organism; but Eberth's bacillus is often confused with very similar species, called pseudo-typhoid bacilli, and it may itself become the seat of modifications so great that the new cultures of the true typhoid bacillus do not recall in any way the typical cultures.

It is the same with the cholera bacillus; Dowdeswell has demonstrated that its polymorphism may extend from the spiral form to that of the amœbiform cell. This polymorphism, so well studied by Dr. Billet, is so real that there is not an observer devoted to the study of a particular species who is not often surprised and sometimes deceived by the unaccustomed aspects of cultures of the same micro-organism and the strange forms which it assumes under certain conditions.

The variations in form in the pathogenic, chromogenic, and zymogenic faculties of bacteria will continue to engage the investigations of bacteriologists for a long time; in doubtful cases it is their duty to make their assertions with extreme reserve.

Regarding qualitative analyses, the denominations which we have above adopted (pure waters, impure, etc.) cannot have a very precise signification: a water which contains only ten typhoid bacilli to the cubic centimetre would be quantitatively pure and qualitatively dangerous; while Vanne water stagnant for twenty-four hours might contain a million bacteria to the cubic centimetre and be absolutely inoffensive.

If, then, it is sometimes delicate to pronounce categorically

upon the existence in water of various pathogenic microbes whose history, however advanced, is not entirely determined, what must be the response of the analyst interrogated upon the presence or absence of hurtful elements in a given specimen of water? Such a question, in so far as it remains general, must be considered as premature in the present state of science; and it must be confessed frankly, rather than timidly affirmed, that among 1,000 or 10,000 bacteria to the cubic centimetre met with in water subjected to enumeration there may exist no bacteria endowed with pathogenic powers. First, that this is not generally accurate; we meet, in many of the waters which we drink and in the dust of the air which we breathe every hour of the day, numerous staphylococci whose inoculation is not inoffensive, and also microbes which strongly resemble both in culture and in pathogenic results the micrococci of erysipelas and septicæmia. I deny micrographists the right, then, to declare as innocent a water whose elements they do not know perfectly; that is, those of which they have not been able to make a complete and perfect qualitative analysis.

If among these elements one or several are fatal to the animal species, does it follow that they are so to man, and that, introduced into the digestive tube, where so many virulent species are found diffused (from the dental arch to the extremity of the rectum), they can produce disturbances of appreciable effect? I do not think so; but it must be confessed that the discovery of a bacterium, in some degree pathogenic, in a water, is calculated to raise numerous doubts, to cause the analyst to hesitate in his responses, and to take away from him the assurance that he is right in always showing that in a water containing few bacteria he has been able to discover only ordinary well-known species or inoffensive ferments.

Before undertaking the general qualitative analysis of a water, the micrographist must not conceal from those interested that he undertakes a lengthy and important work, often of questionable utility and sometimes difficult to complete. Yet it is not rare to find some municipalities resolved, at all sacrifices, to be enlightened upon the micro-organisms of a water which, for instance, it is intended to bring at great expense into a city for use of its inhabitants for a long time

to come. A complete micrographical analysis in this case seems to them perfectly essential; and I agree with them emphatically.

The operator who is charged with this work will follow with profit, I believe, the instructions already given in the preceding pages; he should endeavor to present the results obtained in a simple and perfectly comprehensible form.

He will first study the organisms which will grow upon gelatin, then those which demand other media.

He will determine the number of species that grow indifferently at a low temperature (10° to 20° C.), at a moderate (20° to 30° C.) or at a very high temperature (40° to 70° C.). Among these species he will indicate those which are aerobes, anaerobes, or indifferently belonging to both classes. This done, leaving the general side of these determinations, he will pass in review the pathogenic, zymogenic, chromogenic, and common micro-organisms, having taken care to settle in what proportions these bacteria are found in 1 c.c. or 1 litre of the water submitted to analysis. This work may be continued under the form I indicate, or presented in form more in accordance with the nature of the water analyzed.

Example.

Micrographical analysis of Seine water drawn at the works of Chaillot :

(*Months of August and September,* 1890.)

Quantitative Analysis.

Bacteria to the cubic centimetre, . .	397,500
Bacteria developing in gelatin, . .	312,400
Bacteria developing only in other media,	85,100
Total, ...	397,500
Bacteria, aerobic, ...	334,000
Bacteria, anaerobic, ...	63,500
Total, ...	397,500
Bacteria growing from 20° to 40° C., .	368,000
" " " 40° to 55° C., .	26,500
" " " 55° to 70° C., .	3,000
Total, ...	397,500

Qualitative Analysis.

Species pathogenic,	16,900
" zymogenic,	95,000
" chromogenic,	125,000
" common,	110,000
" undetermined,	50,600
Total,	397,500

1st. Pathogenic Species.

Eberth's bacilli,	2,800
Staphylococci pyogenes,	10,700
Species, phlogogenic,	1,100
" septic,	800
" undetermined,	1,500
Total,	16,900

2d. Zymogenic Species.

Ferments of urine,	10,300
" lactic,	8.600
" butyric,	2,400
" hydrosulphurous,	29,000
" putrefaction,	12,400
" undetermined,	32,300
Total,	95,000

3d. Chromogenic Species.

Species, yellow,	68,000
" orange-colored,	2,500
" green or greenish,	2,200
" red,	35,600
" violet,	500
" bluish,	1,500
" intermediary colors,	14,700
Total,	125,000

4th. Common Species.

Micrococci,	61,500
Bacilli,	24,800
Bacteria,	20,300
Vibriones,	1,200
Streptothrix,	500
Cladothrix,	500
Various,	1,700
Total,	110,000

5th. Undetermined Species.

Morphology difficult to establish,	47,000
Culture difficult to pursue,	3,600
Total,	50,600

If more details are judged necessary and acceptable, each of the preceding divisions may be subdivided.

Let us take, for an example of this development, the yellowish chromogenic species:

3d. Chromogenic Species.

- Yellow Species.
  - Citron,
    - Bacterium xanthinum.
    - M. citreus conglomeratus.
  - Greenish,
    - Micrococcus chlorinus.
    - Sarcina ventriculi.
  - Brown,
    - Bacterium neapolitanum (?).
    - Spirillum tyrogenum.
  - Common,
    - Sarcina lutea.
    - Bacterium cavicida.
    - Bacterium hyacinthi.

In short, the micrographist may complete his task by giving the greatest exactitude possible to his analysis. It is true that this work will demand time, patience, a well-stocked laboratory, some months of daily and assiduous labor; it is only at this price that one succeeds in presenting a suitable

result in any branch of science whatsoever. In reading a result, clearly explained, it is easy for all to appreciate the value of a waver from a micrographic standpoint. The species which could not be studied will be indicated under the heads noted in this table, so that the micrographist also limits his responsibility.

There are cases where the analyst may refuse to make a complete qualitative enumeration; he will do wisely to do this whenever he is charged with the analysis of dirty waters whose study might be prolonged beyond the limits of the time which a micrographist can allow for current analyses. For example, to accept the study of the micro-organisms contained in 1 c.c. of sewer water would be to create long and difficult labors for several years: it would be to attempt difficulties sometimes insurmountable. It is the same in micrography as in chemistry; I do not believe the chemist exists who would undertake to decide upon the elements. I speak of designating them by name; or the substances which are contained in a mixture of extractive products, for example, or again in a compound tincture.

There are micrographical analyses which much resemble these chemical analyses, and which one must not undertake with the idea of obtaining complete and sure results. The difficulties of the work they demand may be explained to those interested, and I believe it will be easy to persuade them to be contented with an analysis comprising the study of such pathogenic bacteria or of such ferments about which monographs have been published.

IV. Prophylactic Means of Combating Infection by Water.

Two methods may be employed to guard against microbes disseminated in water—

1st. They can be kept back by filtration.

2d. They can be destroyed by the action of a sufficient degree of heat.

These two methods are of equal value if properly employed.

Sterilization of Water through Filters.

Many manufacturers have of late, for purely commercial reasons, abused the credulity of the public by boldly declaring certain filters of sponge, asbestos, charcoal, etc., as capable of retaining micro-organisms of water, when the truth is they are not only incapable of holding back the bacteria, but may very often add to the micro-organisms of the water which is directed through them. Filters of cotton, of various textures more or less besprinkled with charcoal, have been made, which, from a property long recognized as belonging to pulverized bodies, may absorb coloring matters, gases, and certain salts; these anti-microbic filters are limited to these powers, which are quickly exhausted.

I will not say that chemical filters are to be held in disdain, especially when it is a question of ridding the water of an excess of calcareous salts, of alkaline sulphurets, etc., organic matters which give it a bad taste or render it unfit for the cooking of food and washing; but it would be very wrong to attribute to these apparatuses a power they do not possess, and it is against this abuse that I object.

In my experiments upon the value of filters with respect to their faculty of freeing water from bacteria, I have found only two filters capable of holding back microbes; the old lithographic-stone filter and Chamberland's porcelain filter.

The lithographic-stone filter, so commonly employed in Paris, is, unfortunately, difficult to obtain in a state of sufficient neatness. These apparatuses, furnished in large numbers by the manufactory, are always poorly manufactured, and the filtering stones badly soldered to the walls of the vessels intended to receive them; further, the drinking-water remains too long in contact with the sediment detritus of every nature, which accumulates near the upper portion of the stones. In summer, the reservoir becomes the receptacle for swarms of bacteria, and thus a sweetish, warm water of very bad quality results.

Chamberland's bougie, universally used in bacteriological laboratories for removing the microbes of water from their bouillons of culture, and for sterilizing by cold all sorts of liquids, is, on the contrary, a perfect filter, from a microbic standpoint. In order to prove it, I will content myself with

reproducing the words of the report which I had the honor of addressing to the rector of the Academie de Paris, July 6th, 1885:

"In order to be sure that any filter possesses the property of retaining the microscopical organisms of the water which passes through it, the experimenter must study to avoid causes of error due to the surrounding atmosphere.

"The filter composed of a series of ten Chamberland's bougies, placed in one of the refectories of the lyceum of Saint-Louis, could not be made to serve for my experiments; it would be necessary to take it apart, and to take the various parts to my laboratory in order to submit them to strict sterilization. Besides, the question asked by the rector of the Académie de Paris may be summed up thus: Do Chamberland's filters allow the passage of bacteria, or do they not, whatever the quantity of water passing through them?

"Experience answers in the negative.

"The following are the researches to which I have given my attention, given concisely:

"Two bougies were taken at random; they had been in operation for six months, at two different points of the Parisian water supply; they were washed in water, in hydrochloric acid, then in an ammoniacal solution, and finally in pure water. The sockets of the bougies, being still wet, were furnished with an India-rubber tube, 0.15 m. to 0.20 m. in length, at the extremity of which was placed a little glass tube containing a stopper of cotton-wool; this arrangement was placed in a vapor bath heated to 110° C. for one hour.

First Series of Experiments.

"One of the sterilized bougies, placed in its metallic fittings, is screwed to a conduit of Seine water showing one atmospheric pressure.

"*Experiment A.*—Before the apparatus worked at all, I adapted to the India-rubber tube, after taking away the tube with cotton wad, a sterilized flask containing 500 grams of concentrated beef bouillon previously free from germs. The tap was then opened, and 830 grams of filtered water drawn. The flask was placed in the stove at 30° to 35° C.

"*Experiment B.*—I allowed the filter to work for three

days, without special precaution; the water flowed drop by drop from the rubber tube at the rate of 12 litres in twenty-four hours. A second flask was then attached to the bougie and received 760 grams of water.

"*Experiment C.*—Three days later, the apparatus working on without interruption, a third flask of bouillon was inoculated with filtered water weighing about 610 grams.

"After twelve days of incubation, the three flasks were still magnificently clear; in fact, 2,200 c.c. of water proceeding from this bougie were freed absolutely from microphytic germs.

"A drop of unfiltered water then introduced into each vessel made them cloudy in eighteen hours.

"As I used three specimens of water—one take at the beginning, the other in the middle, and the third at the end of my experiment—it is to be presumed that the 72 litres of water filtered in six days were also deprived of all bacteria.

Second Series of Experiments.

"These new experiments were conducted precisely like the preceding, with this difference: that the second bougie was placed at a faucet of Ourcq water showing from three to four atmospheres of pressure.

"*Experiment D.*—At the outset of the filtration, 500 grams of beef bouillon received 635 grams of filtered water.

"*Experiment E.*—Five days later, a second vessel of bouillon adapted to the same bougie received 820 grams of filtered water.

"Kept in the stove at 30° to 35° C., the vessels remained free from microbes until a drop of unfiltered Ourcq water was intentionally introduced into each.

"Between experiments *D* and *E*, Chamberland's apparatus furnished 150 litres of water, which I believe I have the right to consider freed from all living organisms.

Last Experiments.

"I could not resist the desire to establish, by some decisive researches, the filtering power of Chamberland's filters upon quantities of liquids not generally used in the micrographical analysis of water.

"*Experiment F.*—A vessel of green glass, of about 50 litres capacity, provided at the neck with a stopper of cotton and its centre run through by an abducting tube designed for the introduction of water and nutritive liquid, was placed for two hours at 180° C., then put in communication with one of the two bougies already mentioned.

"The volume of water conducted into the vessel was 32 litres. To this water, sheltered from dust of the air, 2 litres of concentrated bouillon, containing the extractive principles of 8 kg. of beef meat, were added, a quantity more than sufficient to make the liquid muddy if a bacterium had been able to pass through the porcelain. Here again, after a long stay in the stove, it was impossible to report the slightest alteration.

"*Experiment G.*—Another experiment, made with 35 litres of filtered water; this also gave negative results.

"Consequently Chamberland's porcelain filter is capable of retaining all organisms contained in liquids, and its use for the purification of drinking-water must be strongly advised. To my knowledge, it is the only commercial filter which can efficaciously prevent the transmission of diseases by drinking-waters, if, as we have reason to suppose, water can become the vehicle of pathogenic germs."

The Chamberland Bougie Company, desirous of utilizing its filtering power in industrial operations and in hygiene, have had constructed a great number of filters capable of working under high or low pressures. I have not studied the question of the industrial sterilization of wines, cider, grape-juice, etc., but I must make some mention of the apparatuses provided with one or several bougies ordinarily employed for ridding water of microbes.

Fig. 23 represents Chamberland's bougie contained in a very strong metallic cylinder, whose upper part is screwed to a stopcock placed in a conduit of water. The city water reaches this cylinder, previously purged of air, passes through the porcelain, and gains the interior wall of the bougie in a state of perfect purity; then it flows drop by drop, or in a thin stream, into the vessel intended to receive it.

Chamberland's bougie would have but a very restricted use, were it not possible to obtain it with porcelain of very light paste, very porous, accommodating itself to the passage

of liquids under weak pressures. I have, at my home, a filter of this kind with seven bougies, which has worked very well for five years, and which furnishes one litre of water in a quarter of an hour, under a pressure of about 1.25 m. Thus, with little expense and without special fitting up, we can easily procure water destitute of micro-organisms.

The Chamberland Bougie Company has constructed an extremely simple apparatus, which can be made use of in the

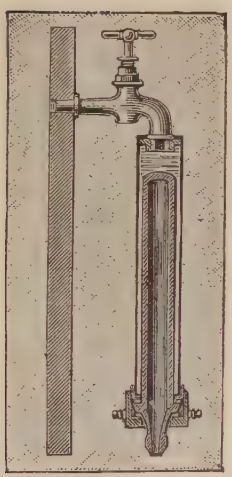

FIG. 23.—CHAMBERLAND'S FILTER WITH ONE BOUGIE.

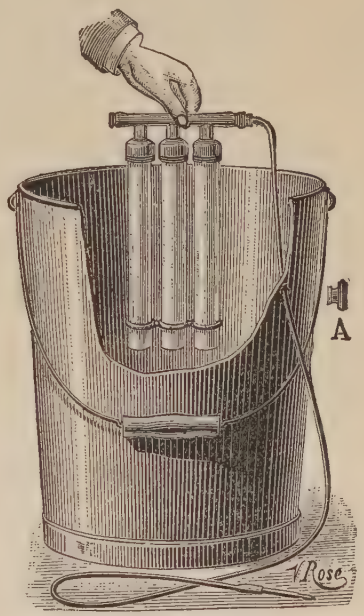

FIG. 24.—HOUSEHOLD FILTER WITH THREE BOUGIES, FOR UNIVERSAL APPLICATION.

city as well as in the country (see Fig. 24). It consists of a bucket pierced by a lateral opening; into this bucket is plunged a battery of three bougies, to which is fitted an abducting tube, passing through the lateral opening, and the closure of which is completed by means of a stopper *ad hoc*. The bucket is filled with water, so as to cover the bougies; the water slowly penetrates into the filter, driving the air before it; the bougies filled, the liquid gains the abducting tube of narrow diameter, and it forms a descending column capable of producing very strong suction if the vessel in which the pure

water is collected is situated just under the bucket. One or two metres difference in level enable one to obtain with sufficient rapidity the volume of filtered water desired. This apparatus is very simple and works automatically.

The very frequent cleansing demanded by Chamberland's bougie has been spoken of; it is true, indeed, that if a very dirty, muddy, or slimy water is passed in large quantity through a battery of bougies, the pores of the porcelain are promptly obstructed; only filters which do not filter possess the quality of permitting the greater part of impurities of all kinds to pass through them.

It is not necessary to have had long experience in chemistry to know that a somewhat cloudy liquid will, at the end of a short space of time, pass with difficulty through filtering-paper. The pores of the latter have a much greater diameter than those of porcelain, and for this reason allow the passage of bacteria: is it to be wondered at that it is necessary to wash the outside of Chamberland's bougie from time to time? This operation, facilitated by the arrangement of the apparatuses, need not be very frequent in the case of the water generally used by city populations. After a month or two of daily use, the bougie is covered with a coating of clay and earth, which can easily be removed by brushing in a jar full of water. Frankly, can one reproach a filter with the need of cleaning now and then? Is it not the custom to clean different household utensils, to wipe up inlaid floors, to brush the furniture, to beat carpets, etc.? If I dwell upon this small question, it is because I know many persons who, under the influence of puerile and unjustifiable criticism, are deprived of the benefits conferred by the use of water freed from all germs. Let these persons be assured that a bougie can be used indefinitely, unless it is broken through carelessness; and as to its cleaning, it occupies less time than does that of a table-cloth.

However, this is a cause of infection common to all filters, and from which it is very difficult to escape, unless in a laboratory with all the antiseptic precautions used in bacteriology. The air, as one knows, is the vehicle of a great number of germs, which lodge upon all objects, and which enter the most minute openings.

Suppose a Chamberland's bougie be left to itself, it must

necessarily happen that some microbes, floating about at will in the currents of air, will deposit themselves upon the bougie and, multiplying, may make their way into the interior of the filter—just as one sees green algæ coming from the soil and climbing up damp walls. By plunging the stem of the bougie, through the intermediary of a sterilized tube, into pure filtered water, we may succeed in retarding but not in preventing infection unless the recipient is carefully freed from germs, and is in communication with the outer air by means of openings furnished with wads of cotton.

The danger to health resulting from this atmospheric infection of filtered waters does not appear serious to me; it is admitted and has been demonstrated that we breathe every day in Paris, during the twenty-four hours, from 50,000 to 100,000 microbes, which, according to circumstances, are introduced into the pulmonary organs and into the digestive tract by the swallowing of food, saliva, and nasal mucus. Moreover, what consumer of filtered water sterilizes the *carafes* in which the water is received and the glasses from which it is drunk? In order to obtain water without microbes, it would be necessary to go further still—to sterilize one's lips, and especially the mouth, which swarms with living bacteria.

In analyzing several specimens of sterilized water of a volume of 100 c.c., which had served to rinse the mouths of as many persons, two hours after eating, I have found that the number of bacteria contained in this water varied between 10,000,000 and 100,000,000 to the cubic centimetre; or from 1 to 10 milliards for each ablution of the mouth: and I must add that among these microbes, which had domiciled themselves in the spaces between the teeth and on the surface of the mucous membrane of the mouth, quite a large number caused the rapid death of Guinea-pigs and mice in whom they were inoculated.

The desire to completely get rid of all microbes is a Utopian idea; do not many of our foods owe their tenderness and their special and strong flavor to the active and searching co-operation of certain bacteria? The aim of filters is especially (and this is the sole point to remember) to rid ourselves of dangerous microbes carried into the waters by industrial processes, by the washing of linen soiled with the evacuations of the sick, or by the direct flowing of sewer-water into the

rivers. As to microbes of the air, if pure and filtered waters may sometimes introduce them into our intestines it is by a physiological act, that of respiration, which singularly completes this infection as concerns the number and variety of bacterian and cryptogamic species.

Sterilization of Drinking-Water by Heat.

When water is heated from its ordinary temperature to 100° C., it loses a great part of the microscopic organisms it contains, but not all of them—according to the well-known works of Pasteur, Chamberland, and Brefeld; Professor Tyndall, it is true, has held a contrary opinion, but experimental facts do not support him.

These are the experiments which I have made during the past seven years or thereabouts to establish the progressive disappearance of bacteria from water subjected to the action of heat ("Semaine Médicale," No. 31, July, 1884). The water upon which the experiment was to be made was placed in a melting-pot of a capacity of 4 to 5 litres previously brought to about 300° C. and then cooled. This water was immediately subjected to a primary analysis, then it was brought to, for example, 45° C.; after keeping it at this temperature for a quarter of an hour, a second analysis was made; then there was an increase in the temperature of the water to 50° C., then, after fifteen minutes, another analysis; and so on up to 100° C. A sufficiently adequate system of heating must permit the very rapid elevation of the liquid to the indicated thermometric halting places; in my experiments, the duration of these successive ascensions did not exceed half a minute.

In order to calculate the rapidity with which water thus treated, abandoned to the air—to the fall of atmospheric impurities—and to the germs of microbes which have resisted 100° C., recovers a number of organisms equal to the primitive number, it is sufficient to make new enumerations in 12 or 24 hours. I need not say that these experiments must be surrounded by the precautions usual in micrography: the pipettes used in drawing the water must be free from germs, and the thermometers plunged into the water in order to measure the degree of heat must be sterilized either at a high temperature if their scale permits or by means of acids or of sublimate.

Table I., given below, was obtained with water from the Seine (?) drawn in June, 1884, from the faucet of my laboratory at the Observatory of Montsouris.

TABLE I.

Seine water from the basin of Villejuif (?).

Temperature of the water.	Bacteria to the Cubic Centimetre.
20° C.,	464.0
45° C. during 15 minutes,	396.0
55° C. " " "	33.0
65° C. " " "	20.8
75° C. " " "	9.6
85° C. " " "	6.6
95° C. " " "	2.8
100° C. " " "	3.3

The same water left at 24° after ebullition gives:

After 24 hours,	2.4
After 48 hours,	116.0

After an interval of ten days, another experiment was made in the same manner with Seine water drawn at Ivry near the hydraulic pumps of Port-à-l'Anglais.

The results obtained are given in Table II.

TABLE II.

Seine water drawn at Ivry.

Temperature of the water.	Bacteria to the Cubic Centimetre.
22° C.,	848.0
43° C. during 15 minutes,	640.0
50° C. " " "	132.0
60° C. " " "	40.0
70° C. " " "	27.2
80° C. " " "	26.4
90° C. " " "	14.4
100° C. " " "	5.2

The same water left at 27° C. after boiling gives:

After 24 hours,	2.6
After 48 hours,	1,072.

Tables I. and II. prove that the number of bacteria in drinking-water diminishes with variable speed, from the ordinary temperature to 100° C. The explanation of this fact has been furnished by my previous researches upon the resistance of schizomycetes to heat ("Annuaire de Montsouris," 1881, § VII., p. 453).

From the ordinary temperature to 45° C., bacteria disappear from the water slowly; this is due to the fact that the majority of microbes easily endure this degree of heat, which is disagreeable for the animal species; meanwhile various micrococci and some delicate bacteria are strongly affected; and if the temperature of 45° C. be long maintained, they disappear little by little and forever.

At 50° C. and 55° C. the tables show a very considerable decrease (from 10 to 1) in the number of microscopic organisms living in drinking-waters; this is due to the prompt and final disappearance of common bacteria and many micrococci. At 60° C. the mucorinæ, the algæ, and the majority of cocci perish.

From 60° C. to 80° C. quantitative analysis does not show a very perceptible decrease in the number of microbes; with the exception of some rare species, which have a faculty of growing at about 70° C., the adult bacteria are dead, and the liquid contains only their germs, which weaken and disappear more or less completely under the growing action of the heat.

Nutritive media inoculated with water between 60° C. and 70° C. present almost exclusively bacillary species.

After fifteen minutes' boiling, the specimens of water with which I have experimented still contain on an average four germs of bacilli to the cubic centimetre.

I wish to insist especially upon this important point: namely, that ebullition maintained for some time frees water of microscopic organisms in the proportion of 995 out of 1,000. These numbers are not absolute, depending, as may easily be understood, upon the nature of the microbes contained in the water. If a water contains only bacteria and micrococci, some minutes' boiling suffices to purify it completely; if, on the contrary, the germs of bacilli are numerous in it, its purification is slow, difficult, incomplete, and perhaps not obtained even when the temperature is maintained at 100° C. for several hours.

Recently my pupil and friend M. Wada, engineer, chief of the meteorological service at the Imperial Observatory of Tokio, devoted himself to some analogous researches in my laboratory, the results of which are given in Tables III. and IV. This experimenter did not operate in the same manner as has been described above; the water drawn from the faucet was placed in a small metallic vessel, then rapidly raised to 50° C.; in a second experiment to 60°, 70°, etc. The duration of the ascension of temperature was observed each time, varying from three to ten minutes; the desired temperature obtained and kept during ten minutes, the analysis was effected by inoculating plates of peptonized gelatin.

TABLE III.

Ourcq water.

Temperature of the water.	Bacteria to the Cubic Centimetre.
14° C.,	460,800.0
50° C. during 10 minutes,	600.0
60° C. " " "	60.0
70° C. " " "	88.8
80° C. " " "	62.4
90° C. " " "	26.4
100° C. " 10 minutes,	0.5
100° C. during 20 minutes,	0.0

TABLE IV.

Vanne water drawn from the reservoir of Montrouge.

Temperature of the water.	Bacteria to the Cubic Centimetre.
13° C.,	4,800.0
50° C. during 10 minutes,	175.0
60° C. " " "	175.0
70° C. " " "	3.0
80° C. " " "	1.7
90° C. " " "	0.3
100° C. " " "	0.0
100° C. " 20 "	0.0

The experiments of M. Wada, like my own, show that it is between the temperatures of 14° C. and 50° C. that the greater

part of micro-organisms disappear from water. Beyond 90° C. they become exceedingly rare; at 100° C. it is difficult to prove the presence of one bacterium to the cubic centimetre when nutritive gelatin is used.

However impoverished in micro-organisms these waters may become by some moments' boiling, they very rapidly recover the number of lost bacteria when exposed to the contact of the air (see Tables I. and II.). Generally, the number of bacteria has rather diminished than increased after a period of twenty-four hours, which is probably owing to the continued action of the heat after ebullition and during the cooling of the vessel; but forty-eight hours later, the growth of bacteria is such that these heated waters generally contain a greater number of bacteria than they showed before they were submitted to the action of heat. This phenomenon is known to be due to the destruction of bacterian virus.

It may be concluded, from this array of facts, that, in the absence of perfect filters, the suspected water may be rid of almost all the microbes it contains, by heating it for some minutes. Experience having, moreover, proven that there exist no pathogenic bacteria whose germs can withstand 100° C., one may conclude that previous boiling of waters is a certain prophylactic measure against the epidemics which originate in the diffusion of bacteria in drinking-waters.

Water kept at 110° to 115° C. for a quarter of an hour, inoculated in doses of one to several litres in media favorable to the culture of bacteria, shows itself deprived of every germ; based upon this fact, several manufactories have constructed apparatuses intended for the sterilization of waters considered pathogenic. The apparatus which seems to fulfil these requirements best has recently been made by M. Rouart and Geneste-Herscher.

This apparatus (see Fig. 25) is composed: 1st, of a boiler A; 2d, of a receiver B; 3d, of a clarifier D; and, when necessary, of an additional receiver C.

The boiler is formed of a coil E, in which the water which is to be freed from germs circulates, and of a little reservoir A, serving as a regulator. The receiver consists of a coil F, into which the sterilized water passes; this coil is surrounded by a receiver B, through which runs the water to be sterilized; the additional receiver C includes a coil making connection with

receiver B and placed in a reservoir open at the top; finally, the clarifier D is simply a filtering apparatus formed of layers of gravel; it is intended to arrest the passage of matters held in suspension by the heated water.

The sterilization is effected as follows:

City water, conveyed by a tap into the tube E, enters recipient B, containing the coil; then it passes through the tube in S, EE (according to the arrows) into the coil of the boiler arranged in the interior of the furnace; during this passage, the water is brought to a high temperature and penetrates into the little boiler; then, by means of the opening FF

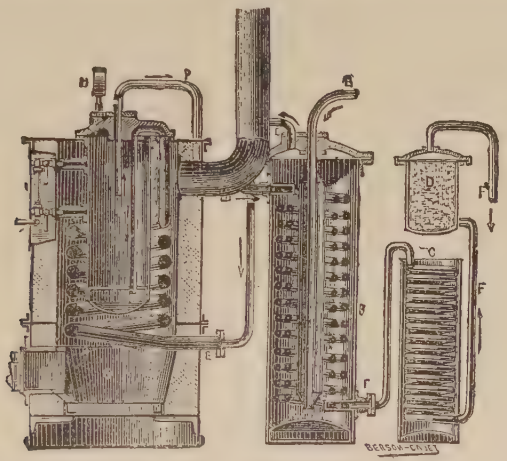

Fig. 25.—Messrs. Rouart and Geneste-Herscher's Apparatus for Sterilizing Water at High Temperatures.

it crosses the coil of the receiver, the second receiver C if necessary, and is finally clarified through the gravel filter D. The purpose of the receiver is to economize in combustibles; by its use, the water to be sterilized is heated and the sterilized water is cooled; it arrives in the coil of the furnace already heated.

The course of the liquid to be sterilized is regulated in such a manner that the water may be brought to a temperature between 115° C. and 130° C. in ten to fifteen minutes; before commencing the operation, in order to free the coils of the receiver and clarifier of germs, a current of vapor under a pressure of about two atmospheres is passed through; this is equivalent to washing with a sterilizing element at 135° C.;

the makers of this apparatus estimate that 1 kg. of charcoal is sufficient to sterilize 100 litres of water; they advocate its use in places or localities in which epidemics reign that are due to the action of drinking-water contaminated with pathogenic microbes, in hospitals and barracks—in short, in localities in which there is reason to suspect that the inhabitants will be sufficiently neglectful of the rules of elementary hygiene in abstaining from submitting the contaminated waters either to sterilization by boiling or by means of filters recognized as excellent.

Municipalities and administrations cannot be too careful in serving to the inhabitants of cities and country, to children in schools, soldiers at the barracks, sailors, etc., water of almost absolute microbic purity, and in watching that no cause of contamination, either direct or indirect, may pollute the current of water and its sources. In case an epidemic arises, it should be their duty to declare as obligatory, and if necessary to force, the use of water sterilized either by means of efficacious filters or by boiling at 100° C. or more. The value of the life of a man cannot be measured by the insignificant cost of the litre of water freed from germs, which he can consume in twenty-four hours.

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By Otto Roth. Revised by Dr. Gregor Schmitt.

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MODERN MATERIA MEDICA,

WITH

THERAPEUTIC NOTES,

FOR THE USE OF

Practitioners and Students of Medicine.

BY

DR. OTTO ROTH.

REVISED BY

DR. GREGOR SCHMITT,

Director of the Royal National and Provincial Boards of Health in Würzburg.

XII—35

I.

THE VARIOUS REMEDIAL AGENTS

GROUPED ACCORDING TO THEIR

Physiological and Therapeutic Actions.

Abortifacients.—Aloes, cotton root, juniper, savine, ergot, ustilago, thuya.

Acids.—Inorganic: hydrochloric, nitric, phosphoric, sulphuric. Organic: acetic, citric, lactic, tartaric.

Anæsthetics.—General: ether, ethylene, ethyl bromide, butyl chloral, chloral hydrate, chloroform, cocaine, hypnone, methylene chloride, morphine, nitrous oxide (laughing-gas), urethan. Local: excessive cold, ether, ethylene chloride, chloroform, cocaine, conium, iodoform, carbonic acid, menthol, opium, veratrum. A mixture of one part of carbolic acid with two parts of glycerin has a local anæsthetic action, and is useful in allowing the painless opening of abscesses, etc.

Electricity (electric bath) in migraine, inflammations, painful ulcers, etc.

Anaphrodisiacs.—Remedies which diminish the sexual appetite are: bromide of potassium and of sodium, quinine, chloral hydrate, turpentine, morphine, camphor.

Antacids.—Carbonate of calcium, of sodium, and of magnesium, calcined magnesia, chalk preparations, etc.

Anthelmintics.—Remedies employed to effect the expulsion of intestinal worms: Santonate of atropine, pomegranate (punicin), ethereal extract of male fern, santonin, tansy (flowers and oil), kousso, kamala, naphthalin, areca nut, oil of turpentine, panna, pelletierine, saoria, and many domestic remedies such as walnut shells, wormwood, dog-rose, pumpkin-seeds, raw onions, and infusion of valerian.

Antiarthritics.—Remedies for gout are: the salts of potassium and sodium, colchicum, and many others.

Antiasthmatics.—Nitrite of amyl, chloral, chloroform, quebracho, stramonium leaves, grindelia robusta, lobelia, morphine, sodium nitrite, nitroglycerin, opium, pyridine, vapor of burning amber and nitre-paper, leeches at the jugulum, cigarettes of stramonium and coca leaves, cracked ice and water ices, hot mustard hand and foot baths, the pneumatic cabinet, sinapisms, dry cupping.

Antidotes.—In general: (*a*) dynamic or antagonistic, which restore the normal processes affected by another poison, such as atropine, hydrate of chloral, and morphine; (*b*) chemical, which combine with the still unabsorbed poison in the stomach or intestinal canal to form harmless compounds. Thus the acids are antidotes in poisoning by alkalies, and *vice versa*, tannin and iodine are antidotes in poisoning by alkaloids, etc. For a list of the specific antidotes in individual cases of poisoning, see the section Therapeutic Notes.

Anti-emetics.—Water of bitter almonds, oxalate of cerium, chloral, cocaine, creosote, morphine, tincture of iodine. For vomiting of pregnancy: iodide and bromide of potassium, menthol, Seidlitz powder, mixture of citrate of potassium (potio Riveri), champagne, cracked ice, carbonated waters (seltzer-water, soda-water, etc.), black coffee, wine, ether. Local applications over the region of the stomach: cold compresses, dry cups, sinapisms.

Antifermentatives.—See Antiseptics.

Antihidrotics.—Remedies employed to repress the secretion of sweat: camphoric, chromic, phosphoric, and tannic acids, agaricin, sulphate of atropine, belladonna, boletus, larch bark, calabar bean, sulphate and tannate of quinine, brandy (with milk), duboisine, homatropine, menthol, picrotoxine, salicylic acid with talc, sage, ergot, sulphonal, talc; lotions of vinegar or brandy.

Antihysterical Remedies.—Asafœtida, bromine and its salts, monobromated camphor, castor, coca, chamomile, peppermint, bromide of potassium and of sodium, kola nut, valerian, valerianate of zinc; baths, electricity, and massage.

Antineuralgic Remedies.—Hyperosmic acid, aconitine, antifebrin, antipyrine, arsenic, butyl chloral, sulphate of quinine, cocaine, colchicine, exalgin, iodide of potassium, morphine,

salicylate of sodium, phenacetin, and tincture of gelsemium. External remedies: chloroform, menthol, oil of hyoscyamus, veratrine; baths, electricity, massage.

Antiphlogistics.—Carbolic acid, by parenchymatous injection and local application, nitrate of silver, mercury (blue ointment), iodine (tincture); laxatives, less frequently diaphoretics, to draw the fluids to other parts; opiates, chloral hydrate, emulsives in general employed with a view of influencing nervous action; a bland diet and abstinence from alcoholic beverages.

Cold in its various modes of application, among which is the cold coil, a long piece of tubing, through which ice-water is made to flow, coiled about the inflamed parts. When ice is not to be had, water may be cooled by keeping it in parchment-paper filters. Ice is best preserved in porous flannel hung up so that the water may flow from it as the ice melts.

Moist heat is, in many cases, better. Sometimes local abstraction of blood, exceptionally in plethoric individuals venesection. Rest, painless compression made on the inflamed tissues, raising or suspending the parts.

The faradic or, more active than this, the galvanic current, is serviceable in certain cases, especially of scrofulous or traumatic inflammation, but it is contraindicated in articular rheumatism and in specific inflammatory affections.

Removal or destruction of the etiological factors (mechanical, chemical, specific, parasitic, etc.)

Antipyretics and Antiperiodics.—The remedies employed for this purpose are, according to the cause of the fever, whether inflammation, cold, specific infection, septic poisoning, etc.: benzoic, hydrochloric, phosphoric, and salicylic acids, alcohol, antifebrin, antipyrine, apiol, bromide of potassium, camphor, quinine and its salts (internally and subcutaneously), quinoline, digitalis, eucalyptus, helenin, iodide of potassium (syphilitic fever), kairine, nitrate of potassium, methacetin, salicylate, dithio-salicylate, and sulphite of sodium, phenacetin, pyrodin (hydracetin), salol, thalline.

Antiphlogistics in general.

Emptying and disinfection of septic foci.

Direct removal of heat: breathing in a cold, dry atmosphere, cold drinks, cold baths, application of ice.

Rest, a fever diet—water, sugar, starch, mucilages, potas-

sium salts; these substances in the form of meat broths and sauces; calves'-foot jelly with meat extract, mildly acidulated jellies, vegetable soups, fruit juices, grits, crackers, and stale white bread. For cooling drinks: water, sweetened water (grape sugar), lemonade, raspberry vinegar, orange juice, tamarind water, sweet whey, and diluted wine. In cases of long-continued fever, small amounts of albuminous substances cannot be dispensed with, and among those may be given: sweet and sour milk, soups with sour cream, yolk of egg; later white meat, boned fowl, cold boiled fish with lemon, calves' head, lean salted meat, and meat broths.

Diaphoresis in catarrhal fever. Refrigerants.

To induce hyperæmia of the skin and the consequent loss of heat, rubbing with bacon is employed.

Antirheumatic Remedies.—Benzoic acid, benzoate of sodium, salicylic acid, salicylate of sodium, antifebrin, antipyrine, hydrochlorate of quinine, colchicum (tincture and wine), ichthyol, iodide of potassium, salicylate of lithium, ethereal oils, propylamin, salol, veratrum viride (tincture), veratrine, etc.

Antiseptics, Disinfectants.—These possess the property of restraining the growth and destroying the lowest forms of animal and vegetable life within and without the body, thus preventing or curing the decomposition, fermentative and septic processes, and the infectious, septic, and zymotic diseases. Outside of the body they are of the greatest utility in prophylaxis and local treatment; but internally also they are of service (given in small doses) in aiding the organism to render harmless any poison (whether microbic or chemical) introduced from without. This action is in part due to the formation of chemical combinations and also to the withdrawal of water from the tissues. The most important of these substances are: aseptinic acid (5 parts of borax in 100 parts of 3% solution of peroxide of hydrogen), benzoic, boric, carbolic, hydrofluoric, salicylic, and sulphuric acids, alcohol, alum, chlorine water, arbutin, nitrate of silver, aromatics, arsenic, aseptol, bela indica, benzoin, beta naphthol, oxyiodide of bismuth, borosalicylic acid, bromine, chloride of lime, roasted coffee, creolin, eucalyptol, glycerin, witch-hazel, helenin, calomel and corrosive sublimate, hydroquinon, iodine, iodoform, iodol, trichloride of iodine, chlorate, permanganate, and nitrate of potassium, green soap, creasote, acetate of aluminium, chlor-

ide of sodium, naphthalin, manganate of sodium, ozone, phenyl borate, acetate of lead, resorcin, sulphocarbolic acid, salol, sozoiodol, sulphate of copper, of iron, and of zinc, tannin and substances containing it, oil of turpentine, thymol, tribromphenol, and trichlorphenol.

For disinfecting the atmosphere are used: acetic acid (vinegar poured on a hot plate), sulphurous acid (made by burning sulphur, about 3 i. for each cubic yard of air space), chloride of lime with vinegar or on a hot plate with carbolic acid; permanganate of potassium, acetate of aluminium, and other disinfectant solutions in the form of spray.

In addition to these are in general: cold and a boiling temperature; filtration of the air through a thick layer of carbolic, salicylic, or boric cotton kept in position by a loosely applied roller bandage. For keeping wounds aseptic, the usual antiseptic dressings.

Antispasmodics.—Hydrobromic acid, ethoxycaffeine, ethylene, nitrite of amyl, ethylbromide, bromide of potassium and of sodium, calabar bean, oxalate of cerium, chloral hydrate, chloroform, hydrobromate of coniine, curare, gelsemium, grindelia robusta, morphine, naphthalin, nitrite of sodium, nitroglycerin, ethereal oils, and pyridine.

Antisyphilitics.—Iodine and mercury in their preparations, infusions of various herbs and woods, and certain mineral waters, such as Aachen, Kreuznach, etc.

Antizymotics.—See Antiseptics.

Aphrodisiacs.—Remedies which stimulate the sexual appetite:

Buchu, cantharides, highly seasoned foods.

Astringents.—An indefinite term for remedies that reduce the size of the cells and narrow the lumen of the vessels, among which are: gallic and tannic acids, alum, nitrate of silver, lime-water, subnitrate of bismuth, catechu, sulphate of copper, sage leaves, uva ursi, kino, hæmatoxylon, acetate of lead, colombo, rhatany, and sulphate of zinc (*conf.* hæmostatic and constipating remedies).

Bitters (*Stomachics*).—In small doses these remedies stimulate the appetite, and in a certain measure control fermentation, while they probably favor the secretion of the digestive fluids.

Pure Bitters: Carduus benedictus, gentian, quassia, tri-

folium fibrinum (Ph. Aust.). The decoctions and extracts of the *Aromatic Bitters*, which exert also a stimulant and carminative action: absinth, angostura, orange leaves, sweet flag, blessed thistle, cascarilla, centaury, orange peel, milfoil, quassia, trifolium fibrinum, and other *Mucilaginous* and *Starchy Bitters:* Columbo, Iceland moss, polygala amara. *Saline Bitters* (resolvents, purgatives): aloes, colocynth, rhubarb, taraxacum, expressed juices of fresh herbs. *Astringent Bitters:* Cascarilla, Colombo, cinchona, butternut, rhubarb. *Stomachic Bitters:* Quinine, nux vomica, orexin. Bitters are best exhibited in the form of cold infusions; powders are the least suitable form for their administration.

These remedies should be given with caution in conditions of plethora, chronic gastric catarrh, organic diseases of the stomach, a tendency to cardialgia, and in the digestive disorders of hypochondriasis and hysteria.

(See Digestives and Carminatives.)

Carminatives, Aromatic Excitants.—These are used in flatulence, colic, insufficient peristalsis, dyspepsia, nausea, belching, and a feeling of oppression after a hearty meal. They consist chiefly of the ethereal oils, aromatic and spiritous remedies: alcoholic substances, aromatic bitters, ethers, benzoate of ammonium, solution of anisated mercury (Ph. G.), water and spirit of ammonia, angelica, cajeput oil, calamus, camphor, caraway seed, cloves, chamomile, cinnamon, fennel, galanga, laurel, lavender, mace, marjoram, melissa, mint, nutmeg, rosemary; tinctures of angelica, anise-seed, orange peel, lavender, rosemary, spirit of camphor, etc.; green tea, thyme, linden-flowers, vanilla, zedoary, and the distilled aromatic waters, aromatic tinctures, and ethereal oils of the drugs above mentioned.

Cathartics.—These excite intestinal peristalsis, hasten evacuation of the bowels, cause a profuse secretion from the intestinal glands, and, as a result of the greatly increased peristaltic action in the small intestine, colon, and rectum, hinder the resorption of the digestive fluids poured out into the intestinal canal. They are called drastics when they act in milligram or centigram doses ($\frac{1}{64}$ to $\frac{1}{6}$ grain), laxatives when they exert the desired effect in decigram doses ($1\frac{1}{2}$ grain), and lenitives or eccoprotics when the active dose is not under one gram (15 grains).

According to their mode of action they may be divided into: *a.* Mild laxatives, in part ordinary dietetic substances, such as fats and oils, honey, sugar of milk, etc.; common salt, carbonic acid, various acids, cooked fruit, milk and whey, kephir; in part including somewhat stronger vegetable and saline substances, such as frangula, manna, compound licorice powder, Seidlitz powder, castor oil, tamarinds; calomel, sulphate and tartrate of potassium, calcined magnesia, carbonate of magnesium, effervescent citrate of magnesium, phosphate and sulphate of sodium, boro-tartrate of potassium and sodium (Ph. G.), bitartrate of potassium, and tartrate of sodium and potassium; enemata, massage. *b.* Moderately active cathartics, such as white agaric, aloes, glycerin and glycerin suppositories, jalap root, podophyllin, senna; various mineral waters such as Franz-Josef, Friedrichshall, Hunyadi Janos, Püllna, Saidschütz, and Sedlitz, and natural and artificial Carlsbad salts. *c.* Powerful (drastic) purgatives, such as aloes, cascara sagrada, colocynth, croton oil, gamboge, resin of jalap, scammony (elaterium).

Laxatives for Children.—Calomel, glycerin, castor oil, compound licorice powder, compound rhubarb powder, syrup of rhubarb and manna (Ph. G.), mixture of rhubarb and soda, enemata, and suppositories.

Caustics.—Substances which liquefy and dissolve albumen, destroy the animal tissues, and produce a scab: Caustic potash, quicklime, caustic ammonia, inorganic and organic acids, arsenic, fused nitrate of silver, sulphate of copper, acetate of copper, aluminate of copper, sulphate of zinc, chloride of zinc, corrosive sublimate, tartrate of antimony and potassium, the actual cautery, and the galvano-cautery.

Cholagogues.—*a.* Those which act upon the liver alone and do not stimulate the intestine: dilute nitro-hydrochloric acid, phosphate of ammonium, ipecacuanha, benzoate and salicylate of sodium. *b.* Those which stimulate both the liver and intestine at the same time: aloes, colocynth, euonymin, jalap, phosphate and sulphate of sodium (Glauber salt), podophyllin, rhubarb, corrosive sublimate, tartrate of sodium.

Constipating Remedies.—Together with a proper diet, various bitters, tannin-holding drugs, and astringents are used, among which are especially: tannic acid, nitrate of silver, salicylate of bismuth, buchu, calomel (especially in chil-

dren), hæmatoxylon, cardamom, catechu, colombo, cotoin, paracotoin, tincture of coto-bark, spices, acacia and mucilaginous substances, morphine, chloride of iron, naphthalin, opium (powder and tinctures), acetate of lead, rhatany, salep, etc. (*conf.* Astringents).

Cosmetics.—Balsams, benzoin, ethereal oils, aromatic acids.

Cough Remedies.—See Expectorants.

Demulcents and Emollients.—They are employed in certain cases to diminish the tension of the skin and mucous membranes, to protect parts deprived of their epidermis from the air, and also to form a protective layer on the mucous membrane of the larynx and stomach. The soothing action upon the urinary tract, which they have been found empirically to possess, has never been satisfactorily explained.

To this class belong the fixed oils, mucilaginous substances, seed emulsions, collodion, albumen, gums, isinglass, and silicate of potassium.

Deodorizers.—Carbolic acid, acetic ether, chlorine, roasted coffee, coumarin, volatile oils, oil of eucalyptus, ozone, sulphur, and vanillin.

Depilatories.—Remedies for loosening and removing the hair are: bisulphide of arsenic, lime, sulphohydrate of calcium.

Diaphoretics, Sudorifics.—*Internal:* salicylic acid, carbonate and chloride of ammonium, camphor, decoctions, jaborandi, kava-kava, solution of the acetate of ammonia, acetate of potassium, nauseants, ethereal oils, pilocarpine, Dover's powder, sarsaparilla, sassafras, saturations, and aromatic teas (chamomile, mullein, linden flowers, various other herbs, and green and black Chinese tea).

In general everything that raises the temperature of the organism to a certain point increases the action of the heart, dilates the cutaneous capillaries, and prevents the abstraction of heat, thus: external warmth, Turkish and Russian baths, hot water, sand, and alcohol baths; covering the body with waterproof substances and those that are poor conductors of heat; and finally also cold in various forms.

Digestives.—Indicated in weak and disordered digestion, dyspepsia, nausea, oppression after a heavy meal and the eating of indigestible substances. In this class come first the spices which in small doses, through local irritation of the mucous membranes, increase the appetite, and also increase, by

reflex action, the secretion of saliva, gastric juice, and probably the intestinal juices, and thereby also increase the force of the peristaltic movements (though not their rapidity). Here belong: anethum, anise, orange peel, cardamom, caraway seeds, cloves, cinnamon, citron, coriander, saffron, fennel, juniper, cherry-laurel, nutmeg, pepper (black, white, Spanish, and Cayenne), vanilla, ginger, etc. Carbonic acid is stimulating to the gastric mucus membrane, promotes absorption of fluids, and strengthens peristalsis. Hydrochloric and lactic acids have a direct digestive action upon albumen, and favor the passage of the stomach contents into the intestine. Acetic acid and chloride of sodium act dietetically. The alkaline carbonates excite increased secretion of the gastric juice, loosen the gastric mucus, and also set free carbonic acid which acts as above stated. Those substances which directly aid in digestion are: pancreatin, pepsin, ptyalin, and hydrochloric acid (*conf.* Bitters and Carminatives).

Disinfectants.—See Antiseptics and Deodorizers.

Diuretics.—*a.* Cardiac, which stimulate the heart, and raise the blood pressure (in the glomeruli), and quiet nervous tension: adonis vernalis, camphor, quinine in small doses, convallaria, digitalis, squill, sparteine, strophanthus: also the stimulants, such as the ethers, especially sweet spirit of nitre, alcoholics, and tonics.

b. Vascular, which act by dilating the renal arterioles: ethereal oils (oil of juniper, of turpentine, etc.), nitrite of sodium, nitroglycerin, sweet spirit of nitre; acetic, carbonic, citric, and tartaric acids; also acid fruits, cider, and wine.

c. Renal, which cause diuresis by direct irritation of the renal epithelium: ether, oils, balsams, cockroach, calomel, caffeine, theobromine (diuretin), sugar of milk, and salicylate of sodium.

d. Saline, apparently acting by increasing osmosis, of which the most commonly employed are: acetate of ammonium and of potassium, nitrate of potassium and of sodium, borotartrate of potassium and sodium, and bitartrate of potassium; also Kissingen and other allied mineral waters.

e. Acids and acid drinks. These act directly like the preceding through the formation of salts in the economy, and also in consequence of the increased volume of water added to the blood.

f. Domestic remedies which act by direct irritation of the kidneys, the nature of which is, however, not yet fully known; among these are: anethum, lappa, cockroach, guaiac, lovage, parsley, sarsaparilla, sassafras, viola tricolor, etc.

Ecbolics.—See Abortefacients and Emmenagogues.

Emetics and Emetocathartics.—These act partly on the vagus terminals in the stomach and partly on the central nervous system, and empty the stomach and duodenum of the food and mucus therein contained, and also—in consequence of the increased expiratory movements and abdominal pressure—expel the retained secretions of the bronchi and biliary passages. The remedies of this class are: apomorphine, sulphate of copper, emetine, ipecac, tartar emetic, sulphate of zinc (lukewarm water).

Emmenagogues.—Indirect emmenagogues, furthering the flow by overcoming general and local pathological states, are the tonics, and especially iron; direct emmenagogues are: aloes, asafœtida (cantharides), myrrh, savine.

General agents which aid in restoring the menstrual flow are: active bodily exercises, warm and stimulating sitz and general baths, carbonic-acid baths, uterine douches (with the vapor of hot water, plain or containing mustard, or with carbonic-acid gas), warm poultices on the abdomen, electricity.

Errhines, Olfactoria.—These act partly upon the terminal filaments of the trigeminus, like ammonia and ether; and partly upon the olfactory nerve, like the ethereal oils, hellebore, and tobacco.

Escharotics.—See Caustics.

Expectorants, Catarrh Remedies.—They act partly by stimulating the muscles concerned in expectoration and the ciliary movements, and partly by causing increased secretion and so diminishing the dry and irritable condition of the mucous membranes, seen especially in the early stages of an acute catarrhal inflammation; or in other cases they limit the too profuse mucous secretion. Remedies in this class are: alum, alkaline carbonates (a portion of the alkali is excreted with the bronchial mucus), carbonate, chloride, benzoate, and succinate of ammonium, ammoniac, anise, apomorphine, copaiba, balsam of Peru, benzoin, camphor and the stimulants in general; emetics in divided doses, eucalyptus, extract of malt, fennel, ipecac, licorice (compound licorice powder),

solution of the succinate of ammonium, pectoral elixir, morphine, myrrh, phellandrium, quillaia, senega, pentasulphide of antimony (Ph. G.), sulphur, tannin, terpinol, terpine hydrate, paregoric. Among the domestic remedies are: warm drinks, aromatic teas, pectoral tea, whey, Eger Franzensquelle mineral water, Krähnchen (with hot milk), Obersalzbrunnen, Selters-water, Soden-water, and others. Saccharine substances are also supposed to make the mucus more watery and thus favor its expectoration and reduce the irritation caused by its presence.

Heart Stimulants.—Atropine, digitalis, strophanthus, wine, etc. (See Stimulants.)

Hæmostatics, Styptics.—These cause coagulation of the blood and so stop hemorrhage: alum, antipyrine, nitrate of silver, ergotin, chloride of iron, surgeon's agaric, Penghawar Djambi, acetate of lead, ergot. Besides these there is a series of metallic remedies: acetate of aluminium, subnitrate of bismuth, sulphate of cadmium, sulphate of copper, sulphate of iron, bichloride of mercury, white and red precipitate, acetate and tannate of lead, acetate, oxide, sulphate, and chloride of zinc. Further, the vegetable substances containing tannin: tannic acid, hæmatoxylon, catechu, kino, cinchona, eucalyptus globulus, butternut, paullinia, oak, rhatany, salvia, etc. Also balsamic and resinous substances which are in part locally astringent, and in part also seem to act through the circulation in the way of reducing hemorrhage and hypersecretion: ammoniac, copaiba, balsam of Peru, benzin, benzoin, colophony, cubebs, creasote, myrrh, tar, turpentine. The following act upon the smooth muscular fibres of the blood-vessels and tissues in such a way as to stop bleeding and hypersecretion: cinnamon, coto-bark and cotoine, hydrastis canadensis, gossypium herbaceum, hamamelis, ipecacuanha, ergot. Less important are dilute sulphuric and phosphoric acids, used in hemorrhage from the lungs and stomach (in the latter case locally coagulant. Vinegar also induces coagulation, and is a favorite popular remedy in epistaxis. In the case of wood vinegar, the astringent action of the creasote may also be of significance).

In metrorrhagia irrigation with hot water (115° to 125° F.) is strongly recommended.

For the special indications for the hæmostatics, the reader

is referred to Part V. Therapeutic Notes, sections on Hæmoptysis, Hæmatemesis, Intestinal Hemorrhage, Metrorrhagia, Epistaxis, Hemorrhage from the Kidneys and Bladder, etc.

Hypnotics.—Amylene hydrate, tannate of cannabinum, chloralamid, chloral hydrate, codeine, hyoscine, hyoscyamine, hypnone, bromide of potassium and of sodium, methylal, morphine, narceine, lactate of sodium, opium, paraldehyde, piscidia, somnal, sulphonal.

Intoxicants (*Ebriantia*).—Alcohol and its derivatives, cannabis indica.

Litholytics.—They dissolve urinary and biliary calculi or prevent their formation; among them are: the alkalies, oil of turpentine, potassium and lithium salts, boro-citrate of magnesium, and various mineral waters (Neuenahr, Obersalzbrunn, Wildungen, etc.)

Mucilaginous Remedies.—Althæa, carrageen, acacia, Iceland moss, flaxseed, salep, tragacanth, quince-seed.

Narcotics and Sedatives.—Aconite, ethylene, alcoholics, ether, nitrite of amyl, bitter almond water (Ph. G.), atropine, belladonna, bromide of ethyl, butylchloral, calabar bean, cannabis indica, chloral hydrate, chloroform, colchicum, conium (curare), hyoscyamus, hyoscyamine, hypnone, bromide of potassium, lactucarium, lobelia, lupuline, morphine, tobacco, opium and its alkaloids, ozone, paraldehyde, stramonium, sulphonal, urethane. (See also Hypnotics and Anæsthetics.)

Nauseants.—The emetics in small doses.

Nutrients.—Albuminates, fats, carbohydrates and substances containing them. Among such are: spermaceti, meat broths, beef-powders, glycerin, kephir, kumyss, cod-liver oil (morrhuol), lipanin (fine olive oil), "mondanin," and peptone preparations.

Ophthalmic Remedies acting upon the pupil and the accommodation:

a. Myotics: morphine, muscarine, physostigmine (eserine), pilocarpine. *b. Mydriatics:* atropine, cocaine, daturine, duboisine, extract of calabar bean, homatropine, hyoscyamine.

Osteoplastics.—Remedies which favor the growth of bone are: arsenic, phosphorus.

Paralyzants.—Chloroform, curare, morphine.

Parasiticides.—Carbolic acid, carbolate of sodium, pyrogallic acid, benzin, chrysarobin, ichthyol, permanganate of po-

tassium, naphthalin, naphthol, balsam of Peru, petroleum, tar, resorcin, green soap, storax, corrosive sublimate, sulphur, mercurial ointment.

Refrigerants.—See antipyretics.

Remedies for Scrofula.—Iodide and phosphate of calcium, iodide of iron and of potassium, iodine, common salt (baths), cod-liver oil, etc.

Remedies Repressing the Secretion of Bile.—These are certain irritants of the intestinal canal, which cause a profuse secretion from the intestinal glands, such as: calomel, sulphate of magnesium (Epsom salt, which has the opposite effect to sulphate of sodium or Glauber's salt), castor oil, chloride of ammonium. Acetate of lead represses the secretion both of the bile and of the intestinal fluids.

Remedies Repressing the Secretion of Saliva.—Atropine, chlorate of potassium.

Resolvents.—In this class belong all those substances which hasten tissue changes and increase secretion and excretion, thus affecting the resolution of pathological products, exudates, etc. These are: diaphoretics, cathartics, diuretics, sarsaparilla, guaiac, expressed juices of fresh herbs, tonics; iodine, mercury, arsenic (alcohol, chlorate of potassium, condurango).

Externally heat in the form of compresses wrung out of hot water or aromatic infusions; wet packing, especially the Priessnitz fomentations. The latter are cold wet (seldom warm) cataplasms, covered with waterproof material, gutta-percha sheets, with a layer of wadding over all, so that they quickly become warm; they are changed only at the end of several hours. (The so-called "Neptune's belt" is a special application of this method locally to the abdomen, put on in such a way that the patient can go about.)

Restoratives.—See Stimulants.

Revulsives, *i.e.* remedies which irritate and redden the skin and raise blisters (Derivatives, Epispastics, Rubefacients, Vesicants).

Mild irritation of the integument, of whatever sort, causes, as we know from experience, a narrowing of the arteries of the skin; and as a result of this, the blood pressure is raised and the heart beats more rapidly and powerfully, the respiratory movements are slowed, and the internal temperature of the body is raised for a time.

Violent and painful cutaneous irritation is, in its early stage, followed by the same effects as the milder form, but in the second stage, which follows quickly upon the first, the opposite condition is found, viz., relaxation and dilatation of the cutaneous vessels, with the resulting congestion. The respiratory movements are still further retarded, the internal temperature falls, while that of the surface rises.

The following are the chief cutaneous irritants and rubefacients:

Alcohol, caustic ammonia and its various preparations, camphor preparations, cantharides (applied for a short time only), resin plaster, various irritant plasters, iodine, iodide of mercury ointment, compound camphor liniment, opodeldoc (soap linment), oil of cajeput, petroleum, sinapisms, compound spirit of angelica, compound spirit of balm, spiritus and tinctura formicarum, tincture of iodine, spirit of wild thyme, spirit of mustard, corrosive sublimate, oil of turpentine, basilicon ointment, veratrine.

In addition to these, the following also belong in this category:

Heat applied in various ways, woollen cloths (mechanical irritants), irritant hand and foot baths (with ashes, salt, mustard, nitro-hydrochloric acid); also cold baths in running water, and douches; carbonic-acid baths, which increase tissue change; electrical brushes; dry-cupping, Priessnitz cataplasms; non-irritant plasters producing simply warmth; moist heat, etc.

To the group of vesicants belong:

Cantharides (vesicating), chloral hydrate, croton oil, and mezereum.

The following cause pustulation or actual wounds of the skin:

The actual cautery, issues, setons, moxæ, tartrate of antimony and potassium, and perhaps also Baunscheidtismus.

Sialagogues, Masticatories.—They act partly through the reflexes, like the spices, and partly by a direct influence on the nerves governing the salivary secretion, like pilocarpine and mercury.

Stimulants, Restoratives, employed in various adynamic conditions, syncope, collapse, neuroses, etc.

Internal Remedies: Alcohol in all forms, wine, cham-

pagne, brandy (with egg or milk), beer, distilled liquors; ether, ethereal oils (those without oxygen, like oil of turpentine, exert a paralyzing effect upon the nervous system, while those containing oxygen, the camphors, are powerful stimulants of the brain and spinal cord); ammonia, benzoic acid, arnica, absinth, asafœtida, camphor, cannabis indica, castor, cocaine, caffeine (coffee, tea), musk, guarana, musk-root, valerian; also the so-called metallic nervines, such as nitrate of silver, arsenic, subnitrate and valerianate of bismuth, iron, iodine, sulphate of copper, ammoniated copper, sulphate of zinc.

External Remedies: Cutaneous irritants, especially rubbing with aromatic and ethereal substances or spirits, warmth, hot and irritating hand and foot baths, as well as also temporary cold douches, electrical brushes, stimulating enemata. (See also Revulsives.) Also subcutaneous injections of ether, or camphorated oil.

Stomachics.—See Bitters and Digestives.

Tonics, Roborants, and Plastics.—In this class belong all those remedies which indirectly strengthen the body, such as the bitters, appetizers, digestives; the blood-forming substances (alcoholics, camphor, cinchona, iron, albumen, etc.) and the nutrients proper (meat, milk, artificial foods, kephir, kumyss, etc.); and also such agents as cold water, sea baths, active exercise (gymnastics, riding, fencing, dancing, travel), fresh oxygen-holding air, mountain climate, sea air, etc.

II.

DRUGS AND OTHER REMEDIES,

ALPHABETICALLY ARRANGED,

With Remarks on their Physiological Action, Therapeutic Use, and Dosage.

ABSINTHIUM.

Wormwood, a stimulant bitter.

Internally, given in doses of gr. xv.–xl. several times a day in powder, decoction, or infusion (5 to 10 parts in 100 of water); also in vinous solution. (Various bitters, containing wormwood in wine, are popularly used as stomachics. The use of this substance in purely medicinal doses continued for several weeks may cause nausea and faintness, or even, as is seen especially in France from the abuse of absinth cordials, epileptic attacks.)

Extractum Absinthii.—Employed as a bitter tonic in dyspepsia in doses of gr. viij.–xv. in pill form several times a day. (An ingredient of the elixir amarum and elixir aurantii compositum.)

Tinctura Absinthii.—Dose, 20 to 50 drops several times a day on sugar, in wine, as an ingredient of various bitters, etc.

Elixir Amarum.—Extract of absinth, 10; oil of peppermint, bitter tincture, aromatic tincture, each 5; water, 25 parts. Dose, 1 to 2 teaspoonfuls, clear or in water, three or four times a day.

ACACIA.

See Mucilaginosa.

ACETANILID (ANTIFEBRIN).

An Antipyretic.—Made by the action of glacial acetic acid on anilin. Occurs in the form of colorless, shining, odorless crystals, having a slightly burning taste, soluble in 194 parts of cold water, in about 18 parts of boiling water, and in 3½ parts of alcohol; readily soluble in ether and alcohol.

Internally: Dose for children, gr. ⅛ for each year of the patient's age; for adults, gr. iij.–viij. every hour or two (maximum dose, gr. viij. or ʒ i. pro die), taken as a powder in wafers, or in pill form. The indications for its use are the same as for that of antipyrine (which see); it is therefore antipyretic, antineuralgic, and antirheumatic. It must be used with caution, as it often acts very powerfully as a heart depressant, producing cyanosis. The effects of the drug are manifested in about two hours after its administration, the first symptom being usually profuse sweating. (Four grains of acetanilid are equal in efficacy to 15 of antipyrine.)

Externally, acetanilid is employed as an antiseptic application, in powder or solution, to sluggish granulations.

℞ Acetanilid, ... ʒ ss.
Sach. albi, ... ʒ i.
M. Divide into 8 powders. S. One powder, in wafer, water, or wine, two to four times a day.

℞ Acetanilid, ... ʒ ss.
Sacchari albi,
Gum. acaciæ, ... āā gr. xv.
Aq. dest., ... q. s.
M. et ft. pil. No. 20. Sig. Three to five pills per day.

(For articular or muscular rheumatism, migraine, neuralgia, angina pectoris, etc.)

ACETONUM.

Internally, in tuberculosis of the respiratory organs, in doses of 5 to 25 drops undiluted; it is also recommended as a nervine in various neuroses.

Externally, it is used in inhalation in spray (0.1 to 1.0 in 100 parts of water) or in vapor after being dropped on cotton.

It is also used in the form of liniment with oil for embrocations.

℞ Acetoni, ... ʒ iv.
Syr. aurant. cort., ... ʒ v.
Inf. valerianæ, ... ℥ iij.

M. S. A tablespoonful three times a day; in neuralgia and rheumatism.

℞ Acetoni, ... gr. xv.
Tinc. saponis,
Ol. olivarum, ... āā ʒ i.

M. ft. liniment. S. To be used with rubbing for the relief of rheumatic pains.

ACETOPHENONUM.

See Hypnonum.

ACETPHENETIDINUM.

See Phenacetinum.

ACETUM.

Internally, vinegar is employed as a cooling drink (10 to 15 parts in 100 of water) in fevers, and in poisoning by narcotics and caustic alkalies, a tablespoonful every ten minutes.

Externally for sponging and in compresses in fevers; by enema (2 to 5 tablespoonfuls in 6 ounces of water or chamomile tea) in adynamic conditions and syncope; as an injection (with astringents) in hemorrhages, nose-bleed, etc.; and as a spray in the sick-room.

Acetum Aromaticum.—Aromatic vinegar. Made by macerating various aromatic substances in vinegar.

Internally it is not much employed.

Externally it is used for the same purposes as vinegar, as a mild disinfectant for sponging the body, and as a spray when there is a disagreeable odor in the sick-room.

ACIDUM ACETICUM GLACIALE.

Glacial acetic acid.

Externally, it is employed diluted to soften horny growths, warts, corns, etc.; as a styptic in slight hemorrhages from the mouth or nose; on compresses for contusions. It is a readily procurable invigorating inhalant. It is recommended

as an efficacious application in psoriasis, and as a caustic to infected wounds and in bites of poisonous serpents.

ACIDUM ACETICUM PYROLIGNOSUM CRUDUM.

Wood-vinegar. Contains acetic acid and tarry substances.

Externally, it is used pure or diluted with water for sponging the body and as a disinfectant. For vaginal injections about two tablespoonfuls may be put in the irrigator full of water. The undiluted crude acid is used for painting the wall of the pharynx two or three times a week in chronic pharyngitis.

ACIDUM ARSENIOSUM.

Arsenious acid, white arsenic.

A *nervine* and *alterative.* Maximum dose, gr. $\frac{1}{12}$, or gr. $\frac{1}{3}$ a day.

Internally, it may be given in solution ($\frac{1}{12}$ to $\frac{1}{6}$ grain in 3 x. water) in teaspoonful doses, or in granules of $\frac{1}{60}$ grain each, several times a day. The best form for administration is the Asiatic pill, the formula for which is given below.

Liquor Potassii Arsenitis.—Fowler's solution. One hundred parts of the solution contain one part of arsenic. Maximum dose 10 drops, or 3 ss. pro die.

Internally, to be employed alone in doses of 2 to 10 drops two or three times a day from fifteen to thirty minutes after meals; the diet should be unstimulating and the bowels must be kept open. This dose is to be gradually increased until toxic symptoms appear: pain in the stomach, conjunctivitis, sleeplessness, dizziness, tremor, dryness of the throat, etc., when the drug must be temporarily or permanently discontinued.

1. In intermittent fever and malarial cachexia, especially in inveterate cases, though also in recent ones, when quinine has failed to relieve, 6 to 10 drops may be given two or three times a day.

2. In periodical neuroses (chorea, epilepsy, neuralgia) and migraine which are rebellious to quinine; also in non-typical cases, which are nevertheless obstinate and of long standing, especially in anæmic individuals, women, and children; for the relief of cardialgia in persons of middle age who have been exhausted by mental exertion.

3. In chronic skin eruptions in conjunction with local remedies; especially in psoriasis, old and extensive eczemas, and in general all chronic skin diseases characterized by infiltration of the cellular tissue and scale-formation; also for the relief of the severe itching attendant upon them.

4. In diabetes mellitus in doses of 30 drops pro die, merely as a symptomatic remedy.

5. In malignant lymphomata, in doses of 5 drops a day gradually increased, and in addition a daily injection of from 1 to 6 drops into the tumor. Care must be taken that the fluid does not escape into the subcutaneous cellular tissue. As the glands decrease in size a "resorption fever" is apt to set in.

6. It has been employed as a prophylactic and in the early stages of pulmonary tuberculosis, but this is not to be recommended. On the first day $\frac{1}{30}$ grain of arsenious acid may be given, on the second $\frac{1}{15}$, and if this is well borne it may be still further increased to $\frac{1}{6}$ grain.

Subcutaneously it has been employed in various nervous affections which are accompanied with tremor. One part of Fowler's solution is mixed with two parts of water, and of this two or three drops may be injected once or twice a day. Great caution is necessary. (It is said to be less apt to induce gastric disturbances when employed in this way.)

Eternally: a. In the form of ointment in very obstinate cases of psoriasis, 1 part to 30 of lanolin, vaselin, etc. *b.* As a caustic in epithelioma and lupus, and in dental caries to destroy the exposed pulp. (See Creasote.) *c.* In nævi, which are to be painted over with Fowler's solution every morning until ulceration takes place.

Liquor Sodii Arseniatis.—Pearson's solution. Arseniate of sodium, 1 part, water 100 parts. Uses and dosage the same as those of Fowler's solution.

Arsenical waters (usually containing iron also) from Levico and Roncegno, in the southern Tyrol. Used in doses of a tablespoonful diluted with water.

℞ Acidi arseniosi, ... gr. vi.
Piperis pulv., ... ʒ i.
Mucil. acaciæ, ... ʒ ij.

M. et ft. pil. No. 100. S. One pill a day, gradually increasing to 3 pills. (Asiatic pill, used especially in eczema and psoriasis.)

℞ Liq. potass. arsenit.,
Aq. menth. pip., ... āā ʒ iiss.
M. S. Four drops three times a day, on every third day 2 drops more, until the dose of 8 drops three times a day is reached, where it should be maintained. (In eczema and psoriasis.)

℞ Acidi arseniosi, ... gr. iss.
Sacch. lactis, ... gr. lxxv.
Tragacanthæ, ... gr. i.
Aquæ, ... q. s. ut ft. massa.
M. et div. in pil. No. 100. S. Two pills three times a day after meals. (In tuberculosis, intermittent fever, and skin diseases.)

℞ Liq. potass. arsenit., ... ♏ xv.
Aq. destill., ... ʒ ss.
M. For subcutaneous injection. (In nervous tremor.)

ACIDUM BENZOICUM.

Expectorant and *Disinfectant.* But slightly soluble in water, readily soluble in ether, alcohol, and chloroform. (Incompatible with ammonium carbonate and alkaline salts.)

Internally in doses of gr. i.–v. several times a day in powder (30 grains daily dose) for scanty expectoration. As an antipyretic in doses of ʒ iiss.–v. a day it is unreliable.

Externally it is, like salicylic acid, recommended as a disinfectant that will not injure the instrument, and may be used in the proportion of 1 part to 250 of boiling water.

Subcutaneously employed, it is a stimulant.

Tinctura Benzoini.—Employed in cosmetic washes.

℞ Acidi benzoici,
Camphor. trit., ... āā gr. i.–ij.
Sacchari albi, ... gr. viij.
M. et div. in chart. No. 10. S. One powder every two hours.

℞ Acidi. benzoici,
Camphoris, ... āā gr. viij.–xv.
Ætheris sulph., ... ʒ iiss.
M. For subcutaneous injection as a stimulant, one syringeful several times a day.

ACIDUM BORICUM.

A *Non-irritant Antiseptic.*

Soluble in glycerin, in 3 parts of boiling water, in 25 parts of cold water, and in 15 parts of alcohol.

Internally it is seldom employed; it may be given in doses of gr. v.–xv. in powder several times a day; or in solution (4 parts to 100 of water).

Externally as a disinfectant in powder with starch, or an ointment (1 part to 9); an ointment consisting of 1 part boric acid to 4 parts paraffin is useful in burns, in otorrhœa, nasal discharges, wounds, and ulcers. A solution of 2 parts in 100 of water may be used for injection into the bladder. In diphtheria a gargle of 1 part to 30 may be used every hour. In the form of an ointment it is of service in pruritus vulvæ, and is employed also as an antiseptic in surgical dressings.

For impregnating surgical dressings (borolint), English lint is soaked in a boiling solution of boric acid, and then dried.

℞ Acidi borici,
Ceræ albæ, ... āā ʒ i.
Ol. amygdal. dul.,
Paraffin. liq., ... āā ʒ ij.
M. S. Boracic ointment.

℞ Acidi boric. pulv., ... ʒ iij.
Iridis pulv., ... ʒ i.
S. To be used as a snuff every two hours. (In ozæna.)

℞ Acidi borici, ... gr. lxxx.
Vaselini, ... ℥ i.
Bals. Peruv., ... gtt. viij.
M. S. For scaly eczema of the scalp.

℞ Acidi borici, ... gr. xv.
Aquæ rosæ, ... ℥ iij.
Aq. mel., ... gtt. v.
M. S. A mild cosmetic face wash.

℞ Acidi borici,
Sulph. præcip., ... āā gr. xv.
Ung. paraffin., ... ℥ iss.
M. S. To be rubbed in twice daily, after washing the head with soap, in herpes tonsurans.

℞ Acidi borici, ... ʒ ij.
Acidi carbol., ... ʒ i.
Morph. sulph., ... gr. x.
Vaselini, ... ℥ i.

M. S. To be applied several times a day, after previously bathing the parts with warm water, in pruritus vulvæ.

ACIDUM CAMPHORICUM.

(An oxidation product of camphor treated with nitric acid.)

Occurs in the form of colorless needles, fairly soluble in alcohol and ether, but soluble with difficulty in water.

Internally it has been used for the night-sweats of phthisis in doses of gr. xv.–xxx. at noon and night, as a powder in wafers.

Externally, in ½ to 1 per cent solution, it is employed in catarrhal affections of the nose, pharynx, larynx, bladder, etc.

ACIDUM CARBOLICUM.

Acidum Phenylicum Crystallisatum, and *Phenolum* or *Acidum Carbolicum Liquefactum* (carbolic acid in crystals, 100 parts; distilled water, 10 parts.)

Aqua Carbolisata (33 parts of carbolic acid to 967 parts of water).

(For disinfection on a large scale, the crude commercial carbolic acid, often mixed with lime or sulphate of iron, is used.) Carbolized lime for the disinfection of privies is made by dissolving 100 parts of freshly burned lime in 60 parts of water and adding, when cool, 5 parts of liquid carbolic acid.

The following is recommended for the disinfection of privies and water-closets: Crude sulphate of iron, 6½ ounces; crude carbolic acid, 5 ounces; boiling water 20 quarts; to be applied in sufficient quantity to render the contents of the vault acid, that is so that they will redden blue litmus paper. It is soluble in 15 parts of water, and in alcohol, ether, chloroform, glycerin, and solution of soda in all proportions. Carbolic acid is most completely dissolved in warm water by stirring.

Internally it is employed but seldom in doses of gr. ⅙–iv.; maximum dose, gr. iss. or gr. viij. pro die (although as much as 4 drops has been given at a dose without unpleasant effects).

It is given in pill form, in alcoholic solution, and also in emulsion, in septicæmia; and has also been highly recommended in the various infectious diseases, such as typhoid fever, cholera, puerperal fever, and intermittent fever, in phthisis, pulmonary gangrene, diabetes, obstinate skin diseases, etc.

Externally it is employed in aqueous or alcoholic solutions or in oil (carbolic oil has not, however, a disinfectant action, although it is aseptic), glycerin, and vaselin in various proportions (1 to 20%). (In making a watery solution, the carbolic acid must be constantly stirred, otherwise it is liable to settle at the bottom of the vessel undissolved.)

a. In surgery it is used for irrigating wounds, in spray, in dressings, for disinfection of the instruments and hands, as a solution in which to keep the sutures, and for surgical dressings of all sorts. (See Hydrargyri chloridum corrosivum.)

b. It is employed pure as a caustic for the destruction of small patches of false membrane in the early stages of diphtheria, of soft chancre, malignant pustule, post-mortem wounds, and the like; also for cauterization of the tooth pulp in dental caries. (See formula below.)

c. In skin diseases, especially when itching is a prominent symptom, in scabies, chronic eczema, pityriasis, impetigo, and prurigo, it is applied one to three times a day in from four to twenty per cent solution; it is also employed as a swab for thrush.

d. In burns, it is applied in the proportion of 1 part to 30 parts of linimentum calcis, and for frost-bites in ointment (1:60).

e. Inhalations of a two or three per cent solution are used in diphtheria, and a stronger solution in absolute alcohol is sometimes employed as a local caustic, but this should be done with caution. As a gargle and for syringing the parts a solution of one-half to one per cent strength may be used, but it should be remembered that, in the case of children, a not inconsiderable amount of carbolic acid may be swallowed in this way.

f. For inhalation in diphtheria, aphthæ, and putrid bronchitis a solution of from ½ to 5 parts in 100 of distilled water is suitable; in pulmonary phthisis, a one-half per cent solution, and in gangrene of the lungs a one to two per cent solution, may be employed every two hours.

g. For washing out the bladder in cystitis, a solution of 1 to 15 grains in 3 ounces of water is of the proper strength; as an injection in gonorrhœa, 1½ to 8 grains to 3 ounces; for syringing out the nose in ozæna, 4 to 15 grains to 3 ounces; for vaginal douching or for an enema in diarrhœa, 1 to 2 grains to 3 ounces.

h. In cases of carcinoma of the cervix uteri, a six to eight per cent carbolic spray is an excellent disinfectant and analgesic application.

For subcutaneous use a solution is to be made of the strength of 1 part to 50 of distilled water.

1. In acute phlegmons of the subcutaneous and subfascial connective tissue, one or two injections may be made daily at the periphery of the lesion.

In erysipelas, as many injections must be made as may be necessary to circumscribe the inflamed area. (One syringeful influences an area about half the size of a playing-card. This mode of treatment should be resorted to at the earliest possible period.

2. In hemorrhoids, after the rectum has been emptied, the tumor is well greased and then an injection is made into its centre of from 3 to 6 drops of equal parts of carbolic acid and glycerin.

3. In the radical treatment of hydrocele, an injection is made into the tunica vaginalis of a little over a drachm of the solution. (A more certain method, however, and one that can now be made quickly and with safety, is direct incision into the sac.)

4. For washing out, with an irrigator, the cavity of a joint from which an effusion has been taken away by antiseptic puncture, a solution of two to three per cent strength is suitable.

When carbolic acid is used internally, or externally in large quantities, especially in intra-uterine irrigation, rectal injection, application over a wide area of an absorbent surface of the skin deprived of its epidermis, or even of the sound integument, it may be absorbed in sufficient amount to produce toxic symptoms. These consist in strangury with a green coloration of the urine, vertigo, a mild degree of stupor, tinnitus aurium, deafness, formication, great weakness, profuse perspiration, a weak pulse, lowered temperature, convulsions,

a feeling as if intoxicated, anæsthesia of the integument, heart weakness, and collapse. In the treatment of carbolic-acid poisoning, the stomach pump should be employed if the drug has been taken internally, and then olive or almond oil with castor oil should be given; saccharate of lime dissolved in large quantities of water, and then sulphate of sodium, in five per cent solution (two or three per cent solution for children). Milk and the white of egg may be given as a protective to the walls of the stomach. Externally oils should be applied to the injured parts.

For disinfectant purposes (destruction of the most resistant of the micro-organisms), solutions of carbolic acid in oil or alcohol are useless; only aqueous solutions (five to ten per cent) have any decided action of this sort.

Liquor Sodii Carbolatis (Carbolic acid, 5 parts; solution of caustic soda, 1 part; distilled water, 4 parts. Should always be freshly prepared).—This solution is miscible in water in all proportions. Its use is the same as that of carbolic acid, but it must be employed in double the quantity in dressings.

The Sulphocarbolates of Calcium, Sodium, Ammonium, and Magnesium have similar, though weaker, antifermentative and antiseptic properties, but possess the advantage of exerting very little or no toxic effect when used internally, doses of 70 or 80 grains being necessary to produce any vertigo. The same is true of sulphocarbolate of zinc, which see under Zincum.

℞ Acidi carbol. crystal., . . . gr. viij.–xv.
Elæosacch. menth. pip., . . . ʒ iiss.
(or mucilag. salep., ʒ v.)
Aq. destillatæ, ... ℥ vi.

M. S. One tablespoonful every two hours. May also be used in inhalation in abscess or gangrene of the lungs.

℞ Acid. carbol. cryst., ... gr̄. viij.
Olei limonis, ... ♏ viij.
Alcohol (90%), ... ♏ lxxv.

M. S. For toothache. A wad of cotton soaked in this solution is placed in the hollow tooth, and over this another wad wet with benzoic acid solution. To be renewed when the pain returns.

℞ Acidi carbolici, ... ʒ i.
Aq. menth. pip., ... ʒ x.
Aq. destillatæ, ... ℥ vi.

M. S. One teaspoonful from two to four times a day, in diabetes.

℞ Acidi carbol. cryst., ... gr. xv.
Alcohol dilut., ... ♏ xvi.
Tinct. iodi, ... ♏ viij.
Glycerini,
Aq. destillatæ, ... āā ♏ xl.

M. S. Twenty-five to 30 drops in one or two tablespoonfuls of water for spray inhalation in diphtheria and pulmonary phthisis. The same mixture may be used to swab the pharynx, or a gargle may be made by adding 40 drops of the mixture to a glass of water, for use in diphtheria.

℞ Acidi carbol., ... gr. xv.
Rhei pulv., ... gr. lxxv.
Mucil. acaciæ, ... q.s.

M. et ft. pil. No. 50. S. One pill after each meal, as required. (For dyspepsia from fermentative changes in the stomach.)

℞ Acidi carbolici, ... gr. xvi.–xl.
Ol. terebinth., ... ℥ iss.
(or glycerini, ℥ iss.)

M. S. For painting the pharynx every two or three hours, in diphtheria.

℞ Acidi carbol., ... ʒ i.–iss.
Glycerini,
Alcohol, ... āā ℥ vi.
Aq. destillatæ, ... ℥ vi.

M. S. For a wash, or to be applied on compresses, in favus and scaly eczema of the scalp.

℞ Acidi carbol., ... ʒ ss.
Alcohol dil.,
Glycerini, ... āā ♏ xv.

M. S. To be painted over the affected parts every day or every second day, after removal of the crusts and epilation, in tinea sycosis. (Three applications suffice to effect a cure.)

℞ Acidi carbol. cryst.,
Collodii flexil., ... āā partes æq.

Or,

℞ Acidi carbol. cryst., ... 3 ss.
Spir. odorati, ... 3 ss.
Morph. hydrochlor., ... gr. viij.

M. S. To be applied on cotton to an aching carious tooth. If necessary, the application may be repeated several times a day.

℞ Acidi carbol., ... 3 i.
Alcohol (sp. gr. 0.960), ... 3 iij.
Liq. ammon. caust., ... 3 i.
Aq. destillatæ, ... 3 ij.

M. To be kept in a colored bottle with a glass stopper. S. For inhalation in acute coryza, etc. A few minims to be dropped on blotting-paper and deeply inhaled. (Olfactorium anticatarrhoicum of Hager.)

ACIDUM CATHARTINICUM.

See Senna.

ACIDUM CHROMICUM.

A Caustic.—Used only externally, either pure or at most mixed with equal parts of water, for cauterization of warts, condylomata, and ulcers. The crystals may be introduced into hypertrophied tonsils. A solution of 1:1,000 in water has been recommended as a douche in ozæna and as an injection in gonorrhœa.

For sweating of the feet a five-per-cent solution may be applied with a brush after the feet have been washed and dried and if necessary may be repeated in a week or a fortnight. Care must be exercised if excoriations are present.

ACIDUM CHRYSOPHANICUM

is contained in rhubarb root, senna leaves, and Parmelia parietina (yellow wall lichen). It is seldom used. It is not identical with chrysarobin (the so-called Goa powder or pulvis ararobæ), but the two are similar in their action.

ACIDUM CITRICUM.

Used internally in powder (in effervescent powders), lozenges (gr. i.–gr. xx. sugar), solution for making lemonade in place of lemon juice (to one pint of water add about 75 grains of citric acid, or two tablespoonfuls of lemon juice, as much sugar as desired, and a drop of oil of lemon), and in saturations.

It is contra-indicated only in acid dyspepsia. It is an ingredient of the potio Riveri, *q.v.* under Sodii Carbonas. The normal proportions for saturation of the most commonly used salts are here given:

		Citric Acid.	Vinegar.	Tartaric Acid.
1 Part	Potassium carbonate, pure....	about 1.0	18.0	about 1.1
1 "	Sodium carbonate.....	" 0.5	9.0	" 0.5
1 "	Sodium carbonate, dried.....	" 1.1	20.0	" 1.2
1 "	Sodium bicarbonate.....	" 0.9	15.0	" 0.9
1 "	Ammonium carbonate.....	" 0.8	14.0	" 0.8

In scurvy, the fresh lemon juice is used as a drink and as an application to the gums. In acute articular rheumatism it may be used in doses of 2 to 8 grains or half an ounce per diem; of fresh lemon juice 3 to 5 ounces a day may be taken.

It may be employed also as a sudorific, as a remedy for catarrhal jaundice, and as a diuretic (in large doses) in dropsy.

Externally it is employed as a mouth wash in cancer of the tongue (2 parts to 250 of water); and is painted over the pharynx in diphtheria, in solution of 125 parts in 10 of water.

Pulvis Refrigerans consists of 1 part of the acid to 12 of sugar; it is used for making lemonade, and is also employed in diarrhœa.

Take of:

Purified carbonate of potassium, . . . ʒ i.
Lemon juice, as much as necessary for saturation.
Syrup of orange flower, ... ℥ i.
(Water of bitter almonds, ʒ i.)
Distilled water, ... ℥ iv.

Mix. One or two tablespoonfuls every hour or two, in painful gastric catarrh, vomiting, etc.

Take of:

Tamarind pulp,	℥ i.
Dissolve in distilled water,	℥ viij.
Add citric acid,	gr. lx.
Strain and add syrup of senna,	℥ i.

Mix. A mild laxative in wineglassful doses. Useful in catarrhal jaundice and gastric catarrh.

ACIDUM CREOSOTINICUM.

Antiseptic.—Employed externally. Readily soluble in alcohol, ether, and hot water. It is said to resemble salicylic acid in its action and to be used for the same purposes, but it is an uncertain remedy and has not been sufficiently tried to enable any definite judgment to be passed upon its value.

ACIDUM FORMICUM.

Rubefacient and Caustic.—Readily soluble in alcohol and water. Employed pure or in strong solution.

Externally used with friction or as a wash, in the place of spiritus formicarum, in the strength of from 1 to 10 parts in 100 of water or alcohol; also in baths and local vapor baths.

ACIDUM GALLICUM.

(Not to be confounded with tannic acid.)

Internally employed, in doses of gr. ij.–viij. in powder, pill, or solution two or three times a day, very commonly but with doubtful effect in hemorrhages of every sort. It is also given in hæmophilia, albuminuria, Bright's disease, diabetes, diarrhœa, rickets, etc.

Externally it is used in powder, ointments, and solutions, like tannin, although it does not possess the local astringent action of the latter. It is employed in the form of injection for metrorrhagia, and is also used as a hair dye.

℞ Acidi gallici,	gr. i.–iij.
Sacch. albi,	gr. viij.

S. To be taken as a powder every two or three hours. (Astringent, similar to tannin.)

℞ Acidi gallici, ... 3 i.
Glycerini, ... 3 iv.

M. S. To be painted on the parts in aphthæ and sore throat.

ACIDUM HYDROBROMICUM.

Internally, in doses of 2 to 20 drops (maximum, 40 drops or 200 pro die) of a solution of 1 part to 100 or 150 of water, in spasmodic cough, vomiting of pregnancy, chorea, tinnitus aurium, etc.

Externally as an application for mercurial stomatitis and in antiseptic dressings.

ACIDUM HYDROCHLORICUM.

Internally, but never long continued, in doses of 3 to 10 drops of the dilute acid several times a day, or in tablespoonful doses of a mixture containing 15 minims of the strong acid in 1 ounce of raspberry syrup and 5 ounces of water; the raspberry syrup may be replaced by other syrups, bitters, or aromatics.

1. It is used as an indifferent drink to relieve the thirst of fevers.

2. In various diseases of the digestive tract (not organic affections of the stomach or acute inflammatory conditions), in pyrosis, dyspepsia with diminished amount of hydrochloric acid in the gastric juice; carcinoma of the stomach, gastrectasia; in dyspepsia due to insufficient secretion of gastric juice, especially in persons of sedentary habit who consume much nitrogenous food; in the dyspepsia of anæmic persons. In these conditions 8 drops may be taken in a wineglassful of water, a quarter to half an hour before, or one hour, when necessary even three hours, after eating.

3. In diarrhœa in consequence of abnormal fermentative processes in the intestinal canal, in catarrh of the stomach (where calomel and creasote are also indicated); in summer diarrhœa of children, etc.

4. In typhoid fever it is preferable to other acids because of its presence in the gastric juice.

5. In purpura hæmorrhagica and scurvy.

Externally.—(*a*) It is used strong as a caustic for warts and excrescences; in one to three per cent solution as a gargle and mouth wash in odontalgia, diphtheria, mercurial stomatitis, etc. For application by means of a brush it is mixed in the proportion of 1 to 3 parts in 25 to 30 of honey or syrup; for bathing and compresses, a one to two per cent solution. (*b*) For a full bath from 2 to 4 ounces may be added to the water, for a foot bath 1 to 2 ounces. For an effervescent bath, as used by Struve, a pound each of crude hydrochloric acid and bicarbonate of sodium may be used.

℞ Acid. hydrochlor.,
Sp. ætheris chlorati, ... āā ♏ xv.
Syr. althææ, ... 3 v.
Aq. destillatæ, ... ℥ iij.
M. Dose: For children a teaspoonful. (In acid and bilious diarrhœa, vomiting, especially occurring during dentition.)

℞ Acid. hydrochlor., ... 3 ss.
Syr. aurant. cort., ... 3 v.
Aq. menth. pip., ... 3 x.
M. Sig. A teaspoonful in a little water after every meal. (In dyspepsia due to an insufficient amount of acid in the gastric juice.)

℞ Acid. hydrochlor. dil., ... 3 ij.
Syr. rub. idæi, ... ℥ ss.
M. Sig. Twenty drops in a wineglassful of sweetened water after every meal.

℞ Acid. hydrochlor. dil., ... ♏ viij.–xv.
Aq. destil., ... Oi.
M. Sig. For washing out the bladder in cystitis.

Take of:
Bone marrow, ... 2 drachms.
Strong muriatic acid, ... 1½ "
Althæa ointment, ... 5½ "
Aqueous extract of opium, . . . 1 "
Camphor, ... 4½ "
Venetian turpentine, ... 9½ "
Mix. Russian ointment for frost bites.

ACIDUM HYDROFLUORICUM.

Dilute fluoric acid.

A colorless gas, soluble in water, made by the action of sulphuric acid upon fluoride of calcium. It has been used as an antiseptic in dressings ½ to 1 part in 500, and has been especially recommended as an inhalation (1 part of gas to 1,000 of air) in diphtheria and also, in specially constructed chambers, in pulmonary tuberculosis.

ACIDUM HYPEROSMICUM AND OSMICUM.

Shining, transparent, very hygroscopic needles having an exceedingly pungent odor.

Internally its use is not to be recommended.

Externally it has been used in parenchymatous injection, in doses of 3 drops of a one-per-cent solution (to be kept in a colored bottle with glass stopper) once a day, in the treatment of malignant new-growths, inoperable sarcomata, and goitre. In hypodermic injection (half-syringeful of a one-per-cent solution) it has been used in neuralgia and sciatica. It is also employed in histological work.

Potassii Osmas.—Used for the same purposes and in the same dose as the preceding. It possesses the advantage of being less hygroscopic than osmic acid.

ACIDUM LACTICUM.

A mildly cauterizing fluid of syrupy consistence.

Internally.—1. As an aid to digestion in doses of 5 to 20 drops of a one-half-per-cent solution. It does not appear to possess any advantage over hydrochloric acid, and like the latter causes digestive disturbances when too long continued or given in too large doses.

2. In the early stages of diabetes mellitus as a substitute for starch and sugar to render possible a strictly meat diet; for this purpose it is given in doses of 1 to 2 drachms a day.

3. In a two-per-cent solution, with simple syrup, it is given, in the diarrhœa of children, in doses of a teaspoonful every half-hour.

Externally.—a. In twenty to eighty per cent solution it is

used as an application in tubercular laryngitis after the previous use of cocaine; also in lupus after previous scraping of the nodules.

b. For dissolving the diphtheritic membrane a five-per-cent solution is applied on a swab, or the drug is used in inhalations of five minutes' duration every half-hour. Also as a mouth wash and gargle in a one-per-cent solution, or weaker.

c. A one to two per cent solution is employed in injections and for dressings.

ACIDUM NITRICUM.

Internally.—(It is used like hydrochloric acid, but is not specially to be recommended.) Best given in drops or a mixture, if possible alone, in one to three per cent solution, in long-continued catarrhal jaundice, cirrhosis of the liver, cholera, and as a diuretic in albuminuria.

Externally in foot baths (about ʒ iss.) or in full baths (ʒ v.), in liver troubles. It is applied with a piece of wood or a glass rod as a caustic to condylomata, lupus, telangiectasis, phagedenic ulcers, and carcinoma; for this purpose the undiluted acid must be used, preferably fuming nitric acid. Felons and boils may not infrequently be aborted by the early application of nitric acid.

℞ Acidi nitrici,
Acid. hydrochlor., ... āā ʒ ss.
Sacch. albi, ... ℥ ss.
Syr. simplicis, ... ℥ ss.
Aq. destill., ... ℥ iv.
M. Sig. One tablespoonful every two hours. (Obstinate jaundice.)

℞ Acid. nitro-hydrochlor., ... ʒ i.
Syr. simplicis, ... ℥ i.
Aq. destillatæ, ... ℥ v.
M. Sig. A tablespoonful three or four times a day. (Jaundice.)

℞ Acidi nitrici, ... ℥ ss.
Aq. destillatæ, ... ℥ iiiss.
M. Sig. To be applied on compresses for frost bites.

ACIDUM PHOSPHORICUM.

A very pleasant and mild acid. A well-known and favorite febrifuge. Mode of exhibition and dosage the same as of hydrochloric acid.

Internally.—Ten to 20 drops of a one to three per cent solution, every two or three hours in water with some fruit syrup.

℞ Acidi phosphorici, ... ʒ ss.
Syr. aurant. flor., ... ℥ i.
Decocti althææ, ... ℥ v.
M. Sig. A tablespoonful every hour, in fever.

℞ Acidi phosphorici, ... ʒ i.
Tinct. cinnamomi, ... ʒ ij.
Mucil. salep, ... ℥ iij.
M. Sig. Teaspoonful in sweetened water every half-hour, in metrorrhagia.

ACIDUM PYROGALLICUM.

Externally, in the form of ointment with lard or paraffin (1 part to 10 or 20) it has been employed with good effect in psoriasis, eczema, and lupus. In phagedenic chancre of the vulva the insufflation twice a day of the following powder has been recommended:

℞ Acidi pyrogallici, ... ʒ i.
Amyli, ... ʒ iv.

The powder must be freshly prepared and kept in a well-stoppered bottle.

In favus, the part should be painted once a day with a one-per-cent alcoholic solution until the scale-formation ceases. (The brown staining of the skin caused by this application may be removed by means of benzin.) A stronger solution (twenty per cent) is irritant and even vesicant, and milder solutions applied over extensive areas of the skin for a long period may give rise to general toxic symptoms. Especial caution must be observed in applying the acid to mucous surfaces.

It is employed cosmetically in watery solutions as a harmless dark brown hair dye.

ACIDUM SALICYLICUM.

Antipyretic, Antiseptic, Antirheumatic.—Occurs in the form of white needles or a light crystalline powder, without odor but with an acrid taste; soluble in about 500 parts of cold water and in 15 parts of boiling water, and readily in alcohol and ether. (See also Salicinum and Salolum.)

The use of salicylic acid often causes vomiting, which may be controlled by rum or subnitrate of bismuth.

Large doses of the acid, less often of salicylate of sodium, frequently cause congestion of the head, dimness of sight, deafness, tinnitus aurium, or delirium. Very large doses (2½ to 3 drachms) of either the acid or the sodium salt may cause death, after marked sinking of the pulse and blood pressure, from paralysis of respiration and convulsions. (Antidote: digitalis.)

Internally the acid or the sodium salt may be used in the same doses and to answer the same indications; it may be given in divided doses of 4, 8, 15, or 30 grains every one to three hours, or ½ to 2 drachms may be given in one dose or divided into two, or the full dose may be given morning and evening. The acid is given only in powder, the sodium salt (soluble in 1 part of water or in 6 parts of alcohol) in capsules or solution, without syrup as it has itself a sweetish taste, but if necessary with some aromatic or in licorice; the best time for administration is with meals.

1. In acute articular rheumatism in young, strong persons, 1 to 2 drachms a day in doses of 15 grains; or the same amount may be given in one or two portions, a small dose being tried first experimentally. In older, weakly persons 1 drachm a day in 8-grain doses; and in children of from five to fifteen years of age, from 30 to 45 grains per diem in 4-grain doses; it may be given also during the night if the patient is wakeful. Cure usually takes place after from 150 to 300 grains have been taken, but after the disease has subsided it is necessary to continue the administration of the drug in gradually decreasing doses for a week. (A dose of 15 grains a day continued for five days is said to have weakened the sexual feeling for a period of three months.)

2. As an efficacious antipyretic, in fevers of all kinds, ½ to 1 drachm of the acid, 45 to 120 grains of the salicylate of

sodium, is given in two doses at an interval of fifteen to thirty minutes, late in the evening, in powder or dissolved in rum or brandy.

3. In neuralgia, especially in sciatica, hemicrania, the peripheral pains of locomotor ataxia, etc., it is given in small repeated doses of 4 to 8 grains up to 75 or 150 grains per diem.

4. In long-standing cases of diabetes mellitus, the drug is said frequently to cause a temporary improvement in the symptoms.

5. It is also given in chronic gastric and intestinal catarrhs, and in diarrhœa with foul-smelling stools.

Externally, salicylic acid is employed as a mouth wash, as an injection into the nose in whooping-cough, and for washing out the bladder or stomach, in solutions of 1 part to from 300 to 1,000 of water; as a dressing to wounds, 1 to 300. An ointment for eczema or a tendency to eczematous eruptions is made with 1 part of salicylic acid to from 10 to 50 of ointment. For a tooth powder or catarrh snuff the acid is mixed in the proportion of 1 grain to 10 grains of charcoal, sugar, tannic acid, etc. For salicylic cotton a four-per-cent solution, or stronger, is suitable. Corns, warts, or callosities may be moistened with boric or salicylic acid solution, covered with a layer of salicylic acid about one-fifth of an inch thick, over which are placed four folds of moistened boric lint, the whole being covered with gutta-percha tissue and left undisturbed for five days. Salicylic acid mixed with prepared talc or starch is a useful application in sweating of the feet or abnormal sweating of any part.

℞ Sodii salicylatis, ... gr. xlv.
Spt. vini gallici, ... ʒ xij.
Solve et adde
Vini Xerici, ... ʒ xx.
Syr. aurant. cort., ... ℥ i.
M. Sig. One tablespoonful before the mid-day and evening meals, in acid dyspepsia.

Take of:
Salicylic acid, ... 3 parts.
Powdered starch, ... 10 "
Venetian talc, ... 87 "
Mix. Powder for profuse sweating of the feet.

℞ Acid. salicyl., ... gr. xv.
Adipis, ... 3 ss.
Lanolini, ... 3 iiiss.
M. et ft. unguentum.
(For eczema, ichthyosis, and ulcer of the foot.)

℞ Acidi salicylici, ... gr. xv.
Zinci oxidi,
Amyli,
Vaselin. flav., ... āā 3 vi.
M. et leniter terendo fiat pasta.
A salicylic paste for application to moist surfaces.

℞ Acidi salicylici, ... gr. xv.
Collodii flexilis, ... ℥ ss.
Ext. cannabis ind. (or Terebinth. venet.), gr. v.
M. Sig. Collodion for corns. To be applied with a brush three times a day.

ACIDUM SCLEROTINICUM.

See Ergota.

ACIDUM SOZOLICUM.

See Aseptolum.

ACIDUM SULPHO-ICHTHYOLICUM.

See Ichthyolum.

ACIDUM SULPHURICUM DILUTUM.

Internally its use is not advisable, but the dose and mode of administration are the same as those of dilute hydrochloric acid. Externally it may be used as a gargle in one to four per cent solution.

Crude sulphuric acid is used for disinfecting fecal discharges, etc.

Mistura Sulphurica Acida.—Haller's acid elixir is composed of 1 part sulphuric acid to 3 parts of alcohol. It has a pleasant taste and may be given in digestive disturbances in doses of 5 to 15 drops several times a day, in sweetened water or barley water. It is also employed in metrorrhagia. A cooling drink may be made by adding 1 to 2½ drachms to a pint of water flavored with raspberry syrup.

Aromatic sulphuric acid is an alcoholic dilution flavored with various aromatics; it is given in doses of 5 to 15 drops in a mucilaginous vehicle, in digestive disorders.

℞ Acid. sulph. dil., ... ʒ ss.
Syr. rubi idæi, ... ʒ v.
Aq. destillatæ, ... ℥ iv.
M. Sig. One tablespoonful every two hours. (For quenching the thirst in feverish conditions.)

℞ Mist. sulph. acidæ,
Tinct. opii, ... āā ʒ ss.
Tinct. cinnamomi, ... ʒ iij.
M. Sig. Twenty drops in oatmeal water every hour. (Metrorrhagia.)

ACIDUM TANNICUM.

Tannin causes coagulation of albumin and is on that account a good astringent and hæmostatic in cases of internal or external administration where it can exert a direct local action. Soluble in 1 part water, 2 parts alcohol, and 8 parts glycerin. It is incompatible with organic substances, especially organic bases and mucilages by which the tannin is precipitated.

Internally employed in doses of 1 to 8 grains several times a day in powder, pill, solution in water, alcohol, or glycerin; or in mixtures in aromatic waters, wine, or syrup.

1. In hemorrhages of the stomach or intestinal canal, in doses of 1 grain every two hours or 8 grains once or twice a day.

2. In the same dose in diarrhœa, especially in chronic cases or in those dependent upon ulcerative lesions; when given for a long period it is liable to disorder the digestion.

3. As an efficient antidote in cases of poisoning with organic substances, the alkaloids such as morphine, atropine, and nicotine, and metallic substances (as long as the poison has not yet been absorbed), since it forms with the last two insoluble tannates.

Its utility is very questionable in cases of hemorrhage where it cannot act locally upon the bleeding part, yet it has a reputation for efficacy in hemorrhagic nephritis, in cystitis, and in whooping-cough.

Externally.—(It makes brown stains on linen, which are very difficult to remove. When used in gonorrhœa, the patient should wear bathing-trunks.)

a. As a hæmostatic when it can be applied directly to the source of the bleeding; as an astringent in vaginal leucorrhœa in a two to five per cent solution applied on a tampon, in powder, pure or better mixed with starch, and also in suppositories in the proportion of 1 part of tannin to 5 parts of cacao butter; as an injection for gonorrhœa, in the proportion of 8 to 15 grains to 3 ounces of red wine; as a gargle (two-per-cent solution) or in five-per-cent solution for painting the parts in chronic laryngitis and pharyngitis; and also as an application in powder, blown in by means of a quill or taken as snuff, to nasal polypi.

b. As an application to frost bites, in twenty-per-cent ointment or liniment.

c. As a drying powder and protective to ulcers and to prevent putridity of the secretions.

d. As an inhalation in non-acute laryngitis, tracheitis, and bronchitis, and also, according to Leube, in pulmonary phthisis. For this purpose a two-per-cent solution may be used, but it is well to begin with a weaker solution (say one-third per cent) in order to test the idiosyncrasy of the patient. When even this weak solution cannot be borne, recourse must be had to alum, which is moreover a better application when there is deep infiltration of the mucous membrane.

e. As an injection (one to two per cent solution) in dysentery of children, and in larger amount in adults. In Asiatic cholera an injection may be given of a solution of tannin with laudanum (see formula).

f. In eczema, dressings wet with a five to ten per cent solution are very useful. The addition of a little alcohol or glycerin makes a solution of tannin clearer and more permanent.

Tinctura gallæ is made by soaking nut-galls in alcohol. It is employed externally. Equal parts of tincture of galls and tincture of iodine are used as a local application in epididymitis.

Sodii tannas and *tannicum albuminatum,* both prepared extemporaneously (see the formulæ below), are said to have a less disagreeable taste, to be more readily absorbed, to irri-

tate the mucous membranes less, and to exert an astringent and hæmostatic effect even in distant organs.

℞ Acidi tannici, . . gr. i.–iv.
Opii, ... gr. ½
Sacchari, ... gr. viij.

M. Sig. One such powder every two to four hours, in profuse diarrhœa.

℞ Acidi tannici, ... ʒ iss.–v.
Tinct. opii, ... gtt. xxx.
Gum acaciæ, ... ℥ iss.
Aquæ (104° F.), ... Oiv.

M. Sig. Enema for cholera.

℞ Acidi tannici, ... gr. xv.–xxij.
Tr. cinnamomi,
Syr. acaciæ, ... āā ʒ vi.
Aq. destillatæ, ... ℥ iss.

M. Sig. One teaspoonful every hour or two, in diarrhœa of children.

℞ Acidi tannici, ... gr. xv.–ʒ i.
Aq. destillatæ, ... ℥ v.
Adde
Liq. sodii carbonatis, ... q.s.
ad react. alkalin.

M. To be kept in well stoppered bottles away from the light. Sig. To be taken in the course of one or two days, in tablespoonful doses. (Liquor sodii tannatis.)

℞ Acidi tannici, ... ʒ ss.
Aq. destillatæ, ... ℥ iij.
Adde agitans
Solutions albuminis ovi unius, . . ℥ iij.

M. Sig. To be taken in the course of one or two days. (Tanninum albuminatum.)

℞ Acidi tannici, ... ʒ iss.

Div. in part. æq. No. 3. Sig. Dissolve one powder in eight tablespoonfuls of red wine, and use as an injection several times during the day. If this has no effect, dissolve the two remaining powders in the same quantity of red wine and inject as before. (For aborting a gonorrhœa in the initial stage.)

℞ Acidi tannici, ... 3 ss.
Zinci sulphatis, ... gr. xv.
Aq. destillatæ, ... 3 iv.
M. Sig. As an injection in gonorrhœa.

℞ Acidi tannici, ... gr. iv.
Ol. theobromæ, ... gr. xlv.
M. et ft. globulus. Vaginal balls for leucorrhœa.

℞ Acidi tannici, ... 3 iv.–v.
Glycerini, ... 3 xij.
M. Sig. Saturate tampons in this solution, introduce into the vagina every night, and leave *in situ* until morning. (For leucorrhœa.)

℞ Acidi tannici, ... gr. xxx.–xlv.
Ung. glycerini (or Spt. camphoræ), . 3 xij.
M. Sig. Liniment for frost-bites.

℞ Acidi tannici, ... gr. viij.
Flor. rosæ pulv.,
Sacchar. pulv., ... āā 3 vi.
M. Sig. Snuff for chronic nasal catarrh, nose-bleed, etc.

℞ Acidi tannici, ... gr. xv.
Ol. theobromæ, ... gr. lxxv.
M. et div. in suppos. No. v. aut x.

The larger suppositories may be used in the rectum or vagina, the smaller for introduction into the nostrils in eczema of these parts.

ACIDUM TARTARICUM.

Action and dose the same as those of citric acid, but it is less hygroscopic than the latter and on that account better adapted to use in the form of powder, but is not so well borne by the stomach. Incompatible with the vegetable bases, potassium salts, hydrochloric and sulphuric acids, iron, and soap.

Internally in doses of 8 to 15 grains several times a day in the form of powder, troches (1 grain each), effervescent powders, mixtures, and in acid whey.

℞ Acidi tartarici,
Sodii bicarb., ... āā ʒ v.
Magnesii carb., ... gr. lxxv.
Elæosacch. citri, ... ℥ iij.

M. An agreeable tasting effervescent powder. Mix a teaspoonful in a glass of water.

℞ Acidi tartarici, ... gr. xxij.
Syr. simplicis, ... ʒ iv.
Decoct. hordei, ... ℥ v.

M. Sig. A tablespoonful every two hours as desired. (Cooling drink.)

ACIDUM THYMICUM.

See Thymolum.

ACONITUM.

A narcotic of rather doubtful utility.

Internally.—Dose, ½ to 1 grain; hardly ever used in powder or pill form, but in the following preparations.

Tinctura Aconiti.—Dose, 2 to 8 drops several times a day up to the maximum dose of 6 minims.

Extractum Aconiti.—Dose, $\frac{1}{12}$ to ¼ grain; maximum dose, ⅓ grain. Both these preparations are employed in neuralgia and rheumatism.

Aconitina.—A preparation which varies much in strength, and is exceedingly poisonous in minute doses.

It has been employed internally in inital doses of $\frac{1}{600}$ grain in pill form, in neuralgia and rheumatism.

Externally it is used to fulfil the same indications in the form of ointment (gr. i.–iss. to ʒ iiss.–iv. of lard).

The subcutaneous mode of administration is exceedingly painful.

First symptoms of poisoning are manifested in difficulty of swallowing, disturbances of tactile sense, disordered movement, disturbances of the psychical functions and gastric disturbances. Antidote: tannic acid.

℞ Extr. aconiti, ... gr. viij.
Tr. guaiaci ammon.,
Vini antimonii, ... āā ʒ iiss.

M. Sig. Ten to 15 drops three times a day, in gout.

℞ Extr. aconiti, ... gr. viij.
Pulv. opii, ... gr. v.
Pulv. glycyrrhizæ, ... gr. xlv.

M. et ft. pil. No. 30. Sig. One pill twice a day, in facial neuralgia.

℞ Aconitinæ cryst., ... gr. $\frac{1}{30}$
Glycyrrhizæ, ... q.s.

M. et ft. pil. No. 20. Sig. Two to four pills a day. (For facial and other forms of neuralgia.)

℞ Aconitinæ cryst., ... gr. ij.
Solve in
Alcohol, ... gtt. x.
Lanolin, ... ℥ ss.

M. Sig. For external use in facial and other forms of neuralgia.

ADONIS VERNALIS.

A succedaneum for digitalis in cardiac diseases, nephritis, and dropsy.

Used internally in infusion (4 to 6 parts to 150 of water) in doses of one tablespoonful.

Adonidinum.—Is used to meet the same indications, in doses of $\frac{1}{12}$ grain in pill, two or three times a day.

ÆTHER.

Sulphuric ether is a powerful stimulant and antispasmodic (especially in hysterical persons), carminative, and anæsthetic.

Internally given in doses of 5 to 20 drops every hour or two on sugar, in sweetened water, or in tea (more commonly in the form of spiritus ætheris compositus and various ethereal tinctures), in syncope and collapse, in various forms of neuralgia, in hysterical attacks, in asthmatic paroxysms, violent vomiting, cardialgia, colic, meteorism, flatulence, and biliary colic. In these affections of the abdominal viscera the drug seems to have a local anæsthetic effect; as it boils at 95° F., it is of course immediately vaporized in the stomach.

Externally.—a. It is used by inhalation and local application in conjunction with its internal administration.

b. It is given by enema in asphyxia, apparent death, and colic.

c. Dropped into the ear it is sometimes useful in tinnitus aurium.

d. Applied by dropping or spray (producing artificial cold) it is often of service in relieving the pain of articular rheumatism, toothache, headache, hysterical hyperalgesia of the skin, incarcerated hernia, etc.

e. By inhalation to induce general anæsthesia in surgical operations. By spray directed against the part to produce local anæsthesia in minor surgical operations. The tip of the atomizer should be held at a distance of one-half to one inch from the part to be anæsthetized, and held there for from one-half to four minutes, in the case of inflamed tissues eight to ten minutes, until the part becomes hard. In the case of a finger or toe, the ligature of the digit will favor the production of the local anæsthesia.

Subcutaneously: In case of sudden collapse from any cause, one or more syringefuls of ether, either pure or camphorated (camphor 1 part, ether 4 parts) may be injected under the skin.

Spiritus Ætheris.—Employed internally to fulfil the same indications as pure ether, and is preferable to the latter. It is composed of 1 part of pure ether to 3 parts of alcohol. It may also be used subcutaneously.

Spiritus Ætheris Compositus.—Hoffmann's anodyne is composed of ether 30 parts, alcohol 67 parts, and heavy oil of wine 3 parts. Dose, ½ to 2 drachms.

℞ Ætheris, ... ℥ iij.
Ol. terebinth., ... ℥ ij.
M. Sig. Fifteen to 30 drops several times a day. (Durande's remedy for gall-stone.)

ÆTHER ACETICUS.

Internally, acetic ether is employed for the same purposes and in the same manner as sulphuric ether, given in doses of 10 to 20 drops.

Externally, it is employed an an inhalant in syncope and collapse, and as a local application in headache.

℞ Ætheris acet., ... ʒ iiss.
Camphoræ, ... gr. viij.
Tinct. opii, ... ʒ ss.
M. Sig. Fifteen to 20 drops every fifteen minutes in the collapse of cholera.

℞ Ætheris acet.,
Tinct. castorei, ... āā ʒ iiss.
Ol. valerianæ,
Vini opii, ... āā ♏ xv.
M. Sig. Ten to 20 drops every two hours in hysterical cardialgia.

℞ Ætheris acetici, ... ʒ iiss.
Moschi, ... gr. iss.–iij.
Ol. menth. pip., ... gtt. vij.
M. Sig. Thirty drops every two hours, as a stimulant in the collapse of cholera, typhoid fever, etc.

ÆTHER AMYLO-NITROSUS.

See Amyl Nitris.

ÆTHER HYDROBROMICUS.

(*Ethyl Bromide*, C_2H_2Br.)

Prepared by distillation of potassium bromide with sulphuric acid and alcohol. A colorless, sweetish liquid, having an odor of chloroform, easily decomposed by the action of light and air. Not to be confounded with ethylene bromide ($C_2H_4Br_2$), which is not narcotic, but is exceedingly poisonous.

Externally used to produce narcosis by inhalation, from 2 to 5 drachms being poured upon the ordinary inhaler. The narcosis so induced appears with thirty to sixty seconds and continues then for ten or fifteen minutes. It destroys the sensation of pain, but does not produce complete unconsciousness, and the patient awakes pleasantly and quietly. For this reason the anæsthetic is to be recommended for small, even though painful, operations. If necessary, the narcosis so produced may be prolonged by the administration of chloroform. Inhalations of ethyl bromide are also recommended in epileptic and hysterical convulsions.

ÆTHYLENUM BICHLORIDUM.

(*Liquor Hollandicus.*)

Externally employed as a local anæsthetic in neuralgias and painful inflammations (articular rheumatism), either pure or mixed with ether. After the liquid is applied, the painful part should be well wrapped up.

AGARICUS ALBUS.

Boletus laricis, purging agaric.

Internally was formerly employed in doses of gr. viij.–xv. several times a day as a purgative. Recently it has been used in doses of gr. iij.–viij. two or three times a day, in powder or pill, as an efficient remedy in the night sweats of phthisis and in the profuse sweating following the administration of antipyrine and similar drugs. It is used for both these purposes, as a popular remedy, as a tincture in brandy.

Agaricina.—*Internally* employed in one or two doses of $\frac{1}{12}$ to $\frac{1}{6}$ grain, in powder or pill (with the addition of opium when there is a tendency to diarrhœa), five or six hours before the time for the appearance of the colliquative sweats in phthisis.

℞ Agaricinæ, ... gr. i.
(Pulv. opii., gr. iij.)
Sacchari, ... ʒ iss.
M. et div. in chart. No. 12. Sig. One or two powders at evening. (For the night sweats of phthisis.)

℞ Agaricinæ, ... gr. iv.
Pulv. ipecac. et opii, ... gr. l.
Pulv. rad. althææ,
Mucil. tragacanth., ... āā ʒ ss.
M. et div. in pil. No. 50. Sig. One or, at most, two pills (representing $\frac{1}{12}$ to $\frac{1}{6}$ grain agaricine) at evening.

ALANTOLUM.

See Heleninum.

ALCOHOL.

In health, alcohol in moderate doses acts as a stimulant and tonic, but in disease it acts as an alimentary substance, especially when other food cannot be borne. In such cases,

taken well diluted with water, it is easily assimilated and imparts to the organism a certain power of resistance in adynamic diseases. This statement of its action furnishes the indication for its employment. Pure alcohol is never used for internal administration, but rather dilute alcoholic liquids, especially wine.

The contra-indications to the employment of alcohol are: childhood, nervous excitability, a tendency to congestions and hemorrhages, and heart disease.

Alcohol Absolutum.—Absolute alcohol (ethylic alcohol) is prepared by dehydrating rectified spirit. Its specific gravity is 0.797.

Spiritus Rectificatus.—Rectified spirit (alcohol) contains about ninety per cent absolute alcohol, and is of a sp. gr. 0.830–0.834.

Spiritus Tenuior.—Dilute alcohol (proof spirit) contains more water than the preceding, and has a sp. gr. 0.928 (U. S. Ph.); that of the B. Ph. has a sp. gr. 0.920; of the Ph. G., 0.892–0.896.

Spiritus Vini Gallici.—Brandy is a distillation product of wine, and contains from forty-six to sixty per cent of alcohol.

Other alcoholic preparations of about the same strength are: Arac made from rice, whiskey (spiritus frumenti) from rye or corn, rum (spiritus sacchari) from molasses, and gin (spiritus juniperi compositus) made from barley with the addition of juniper berries. All these preparations are frequently adulterated and falsified. The difference in taste for the most part depends upon the various ethers.

Liqueurs are prepared from the preceding by maceration with various aromatic and bitter herbs, with the addition of sugar.

Vinum.—Wine contains alcohol (ten to twenty per cent), sugar, tartaric acid, salts, bone-earth (Hungarian wines), various ethers (which impart the bouquet), and coloring matters. The weaker sorts, such as Rhine wine, contain from seven to ten per cent alcohol, while the more fiery southern wines, such as Madeira, Tokay, port, and sherry, contain from fifteen to twenty per cent alcohol besides a considerable amount of sugar. The red wines, containing tannin, have from ten to fifteen per cent alcohol. Then the sparkling wines, in addition to the alcohol and sugar, contain carbonic acid.

Cider contains acids and salts, with very little alcohol; it is laxative and diuretic.

Beer (cerevisia) contains from three to five per cent alcohol, carbonic acid, salts, also many nutrient substances, such as dextrin, starch, albumin, and sugar, and a stomachic bitter (hops). The drinking of beer is indicated in anæmia, emaciation, and weak digestion, and is contra-indicated when there is a tendency to the formation of adipose tissue.

ALOE.

The inspissated juice of the leaves of Socotrine and other varieties of aloes. It is a cathartic bitter and emmenagogue, acting especially upon the large intestine, causing congestion of the pelvic organs, and in small doses aiding digestion. Its cathartic action is very slow, but is not diminished by long-continued administration.

Internally it is best given in pill form, in doses of $\frac{1}{3}$ to 1 grain as a stomachic; 1 to 5 grains as a mild cathartic; 5 to 15 grains as a drastic purgative.

1. In habitual constipation, with or without dyspepsia, in jaundice, and blennorrhœa, when a laxative is indicated. It is contra-indicated only in bleeding piles where the loss of blood is not desired as a palliative, in general plethora, pregnancy, and where there is a tendency to uterine hemorrhage.

2. In hemorrhoids when it is desired to bring back the bleeding.

3. In suddenly suppressed menses and amenorrhœa.

Externally it is employed only in the form of enema in doses of 3 to 20 grains.

Aloin.—Laxative in doses of $1\frac{1}{2}$ to 3 grains, purgative in 3 to 5 grains (maximum dose, 5 grains; or 9 grains per diem). It is given in pill or in glycerin solution (1 part to 5 or 8).

Extractum Aloes.—Administered for the same indications as aloes in pill form in doses of 1 to 7 grains several times a day.

Tinctura Aloes.—Dose (U. S. P.), $\frac{1}{2}$ to 2 drachms several times a day. Exceedingly bitter.

Tinctura Aloes Composita.—(Composed of aloes, 6 parts; gentian, rhubarb, zedoary, and crocus, each 1 part; dilute spirit, 200 parts). Is taken as a tonic in doses of $\frac{1}{2}$ to 1 tea-

spoonful once or twice a day. It is extensively used as a popular remedy under the name of Augsburg elixir of life, or Sulzberg drops.

Pilula Aloes et Ferri.—Composed of 1 grain each of aloes and sulphate of iron. Given in doses of one to five pills several times a day in amenorrhœa.

℞ Aloes, ... gr. xx.
Pulv. rhei,
Saponis, ... āā ʒi.
Extr. taraxaci, ... q.s.
M. et ft. pil. No. 60. Sig. Six to eight pills morning and night. (A mild laxative.)

℞ Aloes pulv., ... ʒi.
Saponis, ... ʒss.
M. et ft. pil. No. 50. Sig. One to three pills at night. (Mildly laxative.)

℞ Extr. aloes, ... ʒi.
Extr. rhei, ... ʒss.
Extr. colocynth. comp.,
Ferri pulv., ... āā gr. xv.
M. et ft. pil. No. 60. Sig. One to three pills as required. (Stahl's drastic pills.)

℞ Extr. aloes, ... ʒss.
Sodii carb., ... ʒi.
Extr. taraxaci, ... q.s.
M. et ft. pil. No. 60. Sig. Two pills morning and night. (Catarrhal jaundice.)

ALTHÆA.

Marshmallow root. *Expectorant.*

Internally used in various preparations, and forms the principal ingredient of pectoral tea. It may be given in decoction or infusion, and is also used as an excipient in pill masses.

Externally used in poultices, and as an emollient mouth wash, gargle, collyrium, or enema.

Syrupus Althææ.—Employed alone in teaspoonful doses, or as an ingredient of various expectorant remedies.

ALUMEN.

Alum is soluble in 10½ parts of water, but insoluble in alcohol. It is a hæmostatic astringent and as such ranks next after tannin for internal use. It is incompatible with the salts of the weaker acids, sulphates, animal and vegetable gelatins, albumen, and coloring matters.

Internally, it is given in doses of 1½ to 15 grains several times a day in powder, pill, or solution, in acute and chronic gastric catarrh and in intestinal hemorrhage, in the latter case being also sometimes administered in enemata. It is, however, not often employed internally, as it is very apt to disorder the digestion.

Externally, it is employed to impregnate tampons and by injection in chronic vaginal catarrh; as a gargle in chronic pharyngitis (as a popular remedy in sage tea); as an inhalation (℥ ss. of a one-per-cent solution) in chronic catarrhal conditions of the respiratory organs; mixed with gum as an application to bleeding ulcers; for scorbutic stomatitis; in skin diseases and sweating of the feet, in ointment or solution (five per cent); and as a hæmostatic mixed with colophony, catechu, sulphate of iron, or kino. Alum makes the enamel of the teeth brittle, and must therefore be used with caution in the mouth.

℞ Aluminis, ... ℥ i.
Decoc. salviæ, ... ℥ v.
Tr. pimpinellæ, ... ℥ iij.
Syr. mororum, ... ℥ v.
M. Sig. Gargle for sore throat.

℞ Aluminis, ... ℥ i.
Vitel. ovi coct. unius.
Glycerini, ... ℥ ss.
M. et ft. unguentum. (Very efficacious, combined if need be with opium, in frost bites and eczema.)

℞ Aluminis, ... gr. xv.–xxx.
Zinci sulph., ... gr. viij.
(or Acidi tannici, ... gr. iij.–x.)
Aq. destillatæ, ... ℥ vi.
M. For injection two or three times a day in gonorrhœa with profuse discharge.

℞ Aluminis,
Zinci suph., ... āā ʒi.
Aq. destill., ... ℥xiv.
M. Sig. As a vaginal injection in pruritus and leucorrhœa.

Alumen Exsiccatum.—Powerfully astringent and mildly escharotic. Diluted with sugar it is employed as a powder in exuberant granulations; and with gum acacia as an application to stop bleeding.

ALUMINII ACETAS.

Solution of the acetate of aluminium (*argilla acetica*) is *styptic* and *antiseptic.*

Externally, it is employed pure or mixed with water (1 part to from 5 to 20). It is recommended as an application, in weak solution, for bromidrosis of the feet or axillæ, for herpes, and ulcers of the feet. In furunculosis of the external auditory canal, the meatus may be filled every hour with a watery solution (1:4) and closed with a wad of cotton. In a one to three per cent aqueous solution it is used as a vaginal injection and for washing out the bladder.

ALUMINII ACETO-TARTRAS.

Externally, aceto-tartrate of aluminium is recommended as a non-poisonous and certain astringent and antiseptic mouth wash and gargle in a one to two per cent solution; as an antiseptic dressing for wounds in one to three per cent solution; and for frost bites in fifty-per-cent solution.

ALUMINII SULPHAS.

Sulphate of aluminium is used in the same strength and for the same purposes as the preceding, and like them is a powerful styptic, though weaker than alum. (It is used in the preparation of acetate of aluminium.)

AMMONIACUM.

A tonic expectorant, though inferior to senega and benzoin, diminishing the secretion in bronchorrhœa; may be employed when neither fever, digestive disturbance, nor a tendency to hemorrhage is present.

Internally it is administered in doses of 5 to 15 grains in pill made with soap and vegetable powder, or in emulsion.

Externally it is employed in the form of plaster (ammoniac 100 parts, dilute acetic acid 140 parts).

℞ Ammoniaci, ... ʒ i.
Vitellum ovi unius.
Aq. fœniculi, ... ℥ iv.
Liq. ammonii anisati, ... ʒ i.
Syr. althææ, ... ʒ v.

M. Sig. A tablespoonful every two hours. Shake well before using.

℞ Ammoniaci,
Saponis,
Pulv. rhei, ... āā ʒ i.

M. et ft. pil. No. 80. Sig. Six to eight pills three times a day.

AMMONIÆ AQUA.

Solution of caustic ammonia is made by dissolving 10 parts of gaseous ammonia in 100 parts of water.

Externally it is employed, diluted with 10 parts of water, as a wash for insect bites, and by subcutaneous or intravenous injection as an antidote to snake bites or to poisoning by chloroform. It is used as a rubefacient and as a stimulant inhalant (but great caution is needed here) in syncope, drunkenness, narcotic poisoning, and with carbolic acid as an abortive remedy in the initial stages of an acute coryza. One teaspoonful added to a wineglassful of water is employed as a lotion for comedones of the face.

Linimentum Ammoniæ.—Volatile liniment. Composed of water of ammonia 30 parts, and cotton-seed oil 70 parts.

Linimentum Ammoniæ Camphoratum.—Composed of 30 parts water of ammonia and 70 parts camphorated oil.

Linimentum Saponis Camphoratum.—Opodeldoc. This is similar to the soap liniment of the U. S. P. It is composed of soap, 40 parts; camphor, 10; oil of thyme 2; oil of rosemary, 3; ammonia water, 25; alcohol, 420.

These four preparations are much used, either pure or mixed with aromatic tinctures, opiates, fatty oils, etc., in embrocations for their derivative and irritant effect upon the skin in rheumatism, paralysis, etc.

AMMONII ACETATIS LIQUOR.

Solution of the acetate of ammonium (Spiritus Mindereri) is a diaphoretic and a feeble diuretic, which may be given in large doses without disturbing the digestion.

Internally, in doses of ʒ i.–iiss. four to six times a day, to promote diaphoresis in mild catarrhs, rheumatism, and dropsy (scarlatinal). It is given in elder-flower tea or in extemporaneous mixtures.

Externally employed as a gargle and in embrocations.

℞ Ammon. carb., ... ʒ i.
Aceti vini, ... q.s.
Ad saturationem.
Vini antimonii, ... ʒ ss.
Syr. aurant. cort., ... ʒ v.
Aq. petroselini, ... ℥ iij.
M. Sig. A teaspoonful every hour for children.

℞ Liq. ammon. acetat.,
Mel. rosæ, ... āā ʒ v.
Infus. flor. sambuci (1:8), ... ℥ vi.
M. Sig. To be used as a gargle in ulcerative scarlatinal sore throat.

AMMONII ANISATI LIQUOR.

Composed of oil of anise, 1 part; water of ammonia (sp. gr. 0.960), 5 parts; alcohol, 24 parts. Anisated water of ammonia.

A powerful expectorant, apt to excite a momentary attack of coughing, which can be avoided, however, by giving the remedy in some demulcent vehicle. It is used in catarrhal inflammation of the smaller bronchi, and in catarrhal and croupous pneumonia with profuse secretion, after the crisis. It is contra-indicated in the stage of acute inflammation, unless in the presence of symptoms of collapse.

Internally in doses of 5 to 15 drops several times a day in some demulcent vehicle, or in extemporaneous mixture (1 to 5 parts to 100). A mixture with water is turbid.

Elixir Glycyrrhizæ (Pectoral Elixir).—Composed of 1 part each of anisated water of ammonia and extract of licorice and 3 parts of fennel water. It is given in doses of 20 to 30

drops three or four times a day, pure or as an ingredient of other mixtures, as an expectorant.

℞ Liq. ammonii anisati, ... ♏ xv.
Syr. fœniculi, ... ʒ vi.
Infusi senegæ (1:20), ... ℥ iij.

M. Sig. A teaspoonful every hour as an expectorant in pneumonia in children. For adults, from three to five times the quantity of the anisated water of ammonia may be usèd.

℞ Liq. ammonii anisati,
Aq. amygdal. amar., ... āā ʒ i.
(Tinct. opii camphoratæ, ʒ ss.)
Aq. aurant. flor., ... ʒ xij.

M. Sig. A teaspoonful two or three times a day in pectoral tea, in chronic bronchitis with profuse secretion. (Pectoral tea is a demulcent infusion made from marshmallow, licorice, mullein-flowers, colt's foot, anise, and orris root.)

AMMONII BROMIDUM.

Indications and dose the same as those of Potassii Bromidum, which see.

AMMONII CARBONAS.

A nervine stimulant and expectorant, possessing also diaphoretic and diuretic properties.

Internally it is given in doses of 3 to 8 grains several times a day in solution or infusion of ipecac, in capillary bronchitis and catarrhal pneumonia of children and aged people, in threatening pulmonary œdema, etc.

Externally it is used for inhalation, and also in ointment (1 to 3 parts in 10) and liniment, and for bathing the skin in solution of 1 to 2 parts in 25, or stronger if an irritant effect is desired.

Ammonii Carbonatis Liquor.—The solution of carbonate of ammonium is made by dissolving 1 part by weight of the salt in 5 parts of water; dose, 20 to 30 drops.

AMMONII CHLORIDUM.

Muriate of ammonia, sal-ammoniac. A solvent expectorant. It is incompatible with salts of the alkalies and with metallic salts.

Internally, in doses of 5 to 15 grains in lozenges (1 part to 8 extract of licorice), aqueous solution, or in some mucilaginous decoction (1 part to 30, with extract of licorice as a corrigens). Of the latter a tablespoonful every hour or two may be given in apyrexial catarrhs with tenacious expectoration, but the long-continued use of the drug is liable to disorder digestion. It is employed frequently in mixtures with one or more of the following: ipecac, tartar emetic, bitter-almond water, extract of belladonna or hyoscyamus, opiates, anisated water of ammonia, and senega.

Externally it is given by inhalation or in gargles (1:40) in acute and chronic bronchitis.

Ammonii et Ferri Chloridum.—Ammonio-chloride of iron is employed (rarely, however) in certain cases of anæmia, dyspepsia, etc., when it is desired to combine the effects of the two drugs. Dose, 3 to 15 grains in pill or mixture (2 to 5 parts to 100).

℞ Althææ rad.,
(Senegæ rad., āā), ... ʒ iiss.
Aq. ut ft. decoct. ad colat., . . . ℥ v.
(Tinct. opii, ♏ viij.)
Ammonii chloridi, ... gr. lxxv.
Ext. glycyrrhizæ, ... ʒ iiss.

M. Sig. A tablespoonful every hour or two, as an expectorant in bronchitis.

℞ Ammonii chloridi, ... gr. lxxv.
(Antim. et potas. tartr., gr. i.)
Ext. glycyrrhizæ, ... ʒ iiss.
Aq. fœniculi, ... ℥ v.

M. Sig. One tablespoonful every hour or two in bronchitis with tenacious sputum.

AMMONII IODIDUM.

Internally, employed in doses of gr. iss.–viij., in syrup with the addition of a few drops of anisated water of ammonia, it is a more certain remedy than iodide of potassium in syphilis, beginning goitre, enlarged spleen, so-called scrofulous affections, etc.

Externally it is applied in the form of ointment (1 part to

25; best prepared extemporaneously by mixing 1 part of iodide of potassium with 8 of chloride of ammonium) as a resolvent to tumors of various kinds.

℞ Ammonii iodidi, ... gr. xlv.
Aq. destillatæ, ... ℥ iij.
Liq. ammonii anisat., ... ♏ iv.
Syr. simplicis, ... ʒ xij.
M. Sig. A tablespoonful every three hours.

℞ Ammonii iodidi, ... gr. iij.
Ol. olivæ, ... ʒ vi.
M. Sig. As an embrocation in the night pains of syphilis.

AMMONII PHOSPHAS.

Internally employed in doses of gr. viij.–xxx., in solution, in the treatment of rheumatism, gout, and the uric-acid diathesis.

AMMONII PICRAS.

Internally employed as a succedaneum for quinine in intermittent fever; it has also been recommended as a specific remedy in whooping-cough in doses of $\frac{1}{6}$–$\frac{1}{2}$ grain two or three times a day. It is an active cardiac poison and is also readily explosive, and care must therefore be taken in dosage and in compounding.

℞ Ammonii picratis, ... gr. i.
Ammonii chloridi, ... gr. xx.
Ext. glycyrrhizæ, ... ʒ i.
Aq. destillatæ, ... ℥ iv.
M. Sig. For a child under three months of age, one-half teaspoonful every three hours; from one to two years, one teaspoonful; and from three to five years, a tablespoonful. (For whooping-cough.)

AMMONII SULPHO-ICHTHYOLAS.

See Ichthyolum.

AMYGDALA AMARA.

Internally employed almost always in the form of

Aqua Amygdalæ Amaræ.—Contains one per cent of oil of bitter almond. Maximum dose, ʒ ij.

Internally it is employed diluted with water, syrup, or in various mixtures and emulsions, frequently with the addition of morphine. (It is incompatible with alkalies, chlorine water, nitric acid, and metallic salts.) In doses of ʒ i.–ij. (U. S. P.) in cardialgia, nervous or sympathetic vomiting, etc., and especially in irritant catarrhs of the respiratory organs and dry cough, and even in inflammatory and pyretic conditions; in phthisis with distressing cough, and also in pertussis.

Oleum Amygdalæ Amaræ.—Externally employed in embrocations, and as an ingredient in liniments, ointments, etc.

AMYGDALA DULCIS.

Sweet almonds are used in the preparation of almond emulsion and of

Syrupus Amygdalæ.—Containing of bitter almond 3 parts, sweet almond 10 parts, in 100 of the syrup.

Mistura Amygdalæ.—Almond emulsion is composed of 6 parts sweet almond, 1 part powdered acacia, and 3 parts sugar, in 100 parts water.

℞ Aq. amygdalæ amaræ, ... ʒ ij.–iv.
Syrupi amygdalæ, ... ʒ iv.
Misturæ amygdalæ, ... ℥ iij.

M. Sig. One-half to one tablespoonful every hour or two, in irritable cough.

AMYL NITRIS.

A clear, yellowish aromatic pungent fluid, which causes, when inhaled, a relaxation of the arterial and bronchial muscular fibres.

Externally it is employed by inhalation (not more than eight to ten inspirations should be taken) in doses of 2 to 5 drops on a handkerchief or blotting-paper, in angina pectoris, asthma, spasm of the glottis, hemicrania, cardialgia, and other neuralgias, tinnitus aurium, singultus, seasickness, chloroform asphyxia, dysmenorrhœa, epilepsy, cocaine-poisoning, lead colic, etc.

The inhalation must be discontinued when congestion and heat of the face are produced. It must never be used when cerebral congestion is present.

℞ Amyl nitritis, ... gtt. x.
Chloroformi, ... ʒ i.
M. Sig. A few whiffs to be inhaled by each asthmatic paroxysm.

℞ Amyl nitrit., ... ʒ i.
Alcohol, ... ʒ ij.
M. Sig. Six to twelve drops for inhalation.

AMYLENUM HYDRATUM.

A clear, colorless, thin, neutral liquid, having a burning taste and an aromatic odor, soluble in 8 parts of water and forming a clear mixture with ether, chloroform, glycerin, benzin, and the fatty oils.

Internally employed in doses of ʒ ss.–i. (maximum), in capsule, extemporaneous mixture (well shaken before using) or in a glass of beer, to induce sleep.

℞ Amyleni hydrati, ... ʒ ij.
Ext. glycyrrhizæ, ... ʒ iiss.
Aq. destillatæ, ... ʒ ij.
M. Sig. Half this amount in one dose at evening.

℞ Amyleni hydrati, ... ʒ i.
Mucil. acaciæ, ... ʒ v.
Aq. destillatæ, ... ʒ xij.
M. Sig. For rectal injection.

AMYLUM.

The starches have the same alimentary value as sugar, into which they are converted by the action of the saliva. They are employed chiefly as a non-stimulating diet in fevers of short duration even though of considerable intensity, and also for individuals of full habit. A diminution of nitrogen in the food by means of vegetable diet, containing more starchy and saccharine substances, is indicated in the uric-acid diathesis and when there is a tendency to rheumatic affections. Starchy food is also given in inflammatory conditions of the gastric and intestinal mucous membrane.

Starchy as well as saccharine foods are contra-indicated in chronic catarrhal affections of the stomach where there is a

tendency to acid decomposition of the ingested matters, in obesity, diabetes mellitus, and (in large amounts) in rachitis, in the first years of life, and also in convalescence from acute diseases in which there has been great destruction of muscular tissue, as after typhoid fever, long-continued suppuration, etc.

Externally starch is employed as a vehicle for remedies given by enema to control diarrhœa and dysentery, as a dusting powder in intertrigo and eczema, and in surgical dressings.

The following contain starch in large proportion: rye, wheat, oats, barley, rice, potatoes, beans, sago, cacao, and acorns. The latter are used as a stomachic tonic, roasted as acorn-coffee. Most of the expensive proprietary foods are made from some of the ground cereals mixed with pea or bean meal. A mixture of finely bolted rye flour with about equal parts of lentil meal furnishes about the proportion of nitrogenous to non-nitrogenous matters required for the organism, and is cheaper and better than most of the prepared infant foods. The meal is put into cold water or milk and cooked for one-half to one hour, and then, with the addition of salt and meat extract if necessary, furnishes an easily digestible and agreeable food for invalids with gastric catarrh and for convalescents; cooked with a little cream, it may be given as a milk substitute to children.

Dextrinum.—Dextrin is a sweetish substance, resembling acacia, soluble in water and diluted alcohol, which possesses nutrient properties and is said to hasten the digestion of other foods. It may be given with other food to children, but is used chiefly in the preparation of surgical dressings and splints (1 part in from 2 to 10 of water).

ANILINUM.

Internally anilin has been recommended in doses of 1 to 2 grains twice or three times a day, in powder, pill, or solution, in the treatment of chorea and epilepsy.

ANTHEMIS.

Chamomile is employed as a carminative, especially in the form of infusion (chamomile tea, ℥ ss.–Oi.) in colic and flatulence, and as a diaphoretic, serving to give a flavor to the

warm water and also acting as an adjuvant to its diuretic action.

Externally it is employed in infusion as an application to atonic ulcers which require a mild stimulation; as an injection in diarrhœa with fetid stools, and in colic; it is also used in making herb pillows, in baths, and in warm, moist cataplasms to reduce pain.

Extractum Anthemidis.—*Internally* given in doses of gr. viij.–xv. several times a day in pills and mixtures.

Externally, in solution, for painting and in dressings to painful parts.

Oleum Anthemidis.—*Internally* employed in doses of ½ to 2 drops.

Externally in alcoholic solution (1 : 100) as toothache drops.

Oleum Anthemidis Infusum.—Made with alcohol and olive oil, and used for embrocations, in ointments, and in enema (in emulsion with the yolk of an egg).

Syrupus Anthemidis.—Employed as a synergist in antispasmodic mixtures.

ANTHRAROBINUM.

A derivative of alizarin or purpurin. See also Chrysarobinum.

Externally it is employed in ten-per-cent ointment or alcoholic solution in the treatment of skin diseases, meeting the same indications as chrysarobin. It acts less energetically than the latter, but is just as reliable, and is less irritant, being therefore suitable for use on the face.

ANTIFEBRINUM.

See Acetanilidum.

ANTIMONII ET POTASSII TARTRAS.

Tartar emetic occurs in the form of white crystals or a crystalline powder, soluble in 17 parts of cold and 3 parts of boiling water.

An emetic which excites great nausea, causes diarrhœa, disorders the digestion, and sometimes induces alarming collapse, for which reason it should be used only in the case of robust individuals.

Internally (maximum dose, gr. iij., or gr. viij. pro die) given

in doses of gr. $\frac{1}{12}$–$\frac{1}{6}$ several times a day as an expectorant, resolvent, and diaphoretic; of gr. $\frac{1}{6}$–$\frac{1}{3}$ every hour or two as a nauseant (often causes vomiting also); and of gr. $\frac{1}{3}$–$\frac{1}{2}$, usually with ipecac gr. iss.–xv. (these doses repeated every 10 to 15 minutes until from 2 to 4 have been taken), as an emetic, in powder or suspension.

It should not be given in infancy or old age, nor in any condition where its usual action upon the gastro-intestinal tract and the heart is to be feared.

Externally it is used in solution of gr. viij.–xv. in ℥ iij. as an injection into fistulæ with the object of exciting an adhesive inflammation, and as an injection into cystic tumors (see formula).

Vinum Antimonii.—Tartar emetic, 4 parts; boiling distilled water, 60 parts; and stronger white wine, 1,000 parts. Given as an emetic for children in doses of one-half to one teaspoonful every fifteen minutes; as an expectorant, 10 to 30 drops several times a day.

Unguentum Antimonii.—Autenrieth's salve. Contains 2 parts of antimony in 8 of paraffin ointment. It is used as a derivative, especially in meningitis, applied to the shaven scalp, and in laryngitis. The pustules caused by it leave behind very ugly white scars.

℞ Ant. et pot. tart., ... gr. i.
Ammonii chloridi,
Ext. glycyrrhizæ, ... āā ʒ i. ℈

M. et div. in chart. No. 10. Sig. One powder every three hours. (Expectorant and resolvent.)

℞ Ant. et pot. tartr., ... gr. iss.
Pulv. ipecac., ... ʒ ss.

M. et ft. pulvis. Sig. One-fourth part to be taken every ten minutes, to cause emesis.

℞ Vini antimonii,
Oxymel. scillæ, ... āā ℥ ss.

M. Sig. A teaspoonful every ten minutes until vomiting is produced.

℞ Ant. et potass. tart., ... gr. viij.
Aq. destillatæ, ... ℥ ss.

M. Sig. From a few drops to a syringeful (15 drops) to be injected into small cystic tumors of the scalp. At the end

of from thirty to thirty-six hours the wen will be found to be a little painful, and soon thereafter (by the end of the second or third day) the entire sac may be pressed out through the slightly inflamed puncture made by the needle, which will probably have to be enlarged. This is a tolerably certain method.

Other formulæ will be found under Digitalis, Potassii Nitras, Ipecacuanha, Camphor, and Ammonii Chloridum.

ANTIMONII PENTASULPHIDUM.

Insoluble and easily decomposed. A solvent expectorant, which sometimes causes nausea like tartar emetic, but which acts very well, when mixed with a little extract of opium, in the treatment of dry catarrhs.

Internally employed in doses of gr. $\frac{1}{6}$–iss. three or four times a day, in powders or pills; it is often combined, according to the indications present, with calomel, Dover's powder, opium, benzoin, camphor, licorice, ipecac, chloride of ammonium, and sugar.

℞ Antimonii pentasulph., ... gr. iss.–v.
Extr. opii, ... gr. iss.
Sach. albi, ... ʒ i.
M. et div. in chart. No. 10. Sig. One powder three or four times a day.

℞ Antim. pentasulph.,
Hydrarg. chlor. mitis, . . . āā gr. iss.
Sacch. albi, ... ʒ i.
M. et div. in chart. No. 10. Sig. One powder every two or three hours. (Flummer's powder, for children.)

ANTIPYRINUM.

An *antipyretic*, *antineuralgic*, and *antirheumatic*. Prepared synthetically from anilin and acetic ether. It occurs as a white crystalline powder, readily soluble in water, and possessing a slightly bitter taste, which is easily disguised by wine or aromatic water.

Internally it is employed in powder or solution (with syrup), in doses of $\frac{1}{6}$ grain for each month, or $1\frac{1}{2}$ grains for each

year, of life for children; gr. viij.–xv. two or three times a day for adults; maximum dose, gr. lx.–lxxv. pro die. It frequently produces unpleasant symptoms, such as profuse sweating, vertigo, heart weakness, less frequently vomiting and collapse, and occasionally a rash resembling that of measles.

1. In all pyrexial diseases, inflammations of every sort, also in tuberculosis, intermittent fever, etc., to reduce temperature and pulse.

2. In doses of from 8 up to 15 or 20 grains at the beginning of an attack of hemicrania, and repeated in dose of 8 grains, on an empty stomach; also in other forms of neuralgia, migraine, etc., and in whooping-cough and influenza (see formula).

3. In doses of gr. xv. three times a day, in conjunction with the bromides (see Potassii Bromidum), in chorea minor. Also in the lancinating pains and twitching of locomotor ataxia.

4. In acute muscular and articular rheumatism it exerts a specific effect like salicylic acid. It is recommended to give for the first three days a tablespoonful of a solution of 2½ drachms of antipyrine in 5 ounces of water (without syrup) every three hours. Later, when the fever and local symptoms have subsided, the solution is to be continued in doses of one tablespoonful a day for five days; or, if a relapse is to be apprehended, three tablespoonfuls a day may be given for several weeks.

5. It has been strongly recommended in diabetes insipidus, beginning with single doses of gr. viij.–xv. (℥ ss. a day) to test the idiosyncrasy of the patient, and then increasing the dose by 15 grains a day until a maximum daily amount of ℥ iss. is reached; at the end of a week, when the polyuria has been reduced, the remedy is to be discontinued to test the permanence of the cure, and may then be recommenced, if necessary, in the dose that has been found to be efficacious.

Externally, antipyrine has been used, in five-per-cent solution, as a local hæmostatic in epistaxis, and also applied in powder to wounds, and at the same time given internally. In chronic ulcers of the leg, when there is a foul discharge, it is applied in powder and covered with salicylated cotton.

The drug may be administered by enema, in doses of ℥ ss.–i., when it is not well borne by the stomach.

For subcutaneous use a solution is made of equal parts of

antipyrine and boiling water. It may be employed in this manner in neuralgias, biliary, nephritic, and other forms of colic, rheumatism, etc. The action of the drug, when given hypodermically, is quite certain, and unpleasant symptoms are less liable to ensue, but there is sometimes quite a powerful local reaction.

℞ Antipyrini, ... ʒ iiss.
(Syr. aurant. cort., ʒ vi.)
Aq. destillatæ, ... ℥ v.

M. S. A tablespoonful from three to five times a day. (Each dose contains 15 grains of the drug.)

℞ Antipyrini, ... gr. xv.
Vini Tokayensis,
Aq. destillatæ, ... āā ʒ vi.
Syr. aurant. flor., ... ʒ xij.

M. S. A tablespoonful every two hours. Larger doses for adults, smaller for young children. (Pertussis.)

APIOLUM ALBUM CRYSTALLISATUM.

A stearopten in colorless acicular crystals, obtained from Apium petroselinum, common parsley.

Internally, employed in doses of gr. iv.–xv. several times a day, up to a maximum daily dose of ʒ i., in powder, syrup, or capsules, as a substitute for quinine in intermittent fever, and also for amenorrhœa. Symptoms of intoxication are produced by large doses, of ʒ ss.–i.

Apiol.—A yellowish oily liquid, of a peculiar odor and pungent taste, obtained from parsley. It is given, like the preceding, for amenorrhœa and dysmenorrhœa, in doses of 3 to 6 minims in capsules.

APOMORPHINÆ HYDROCHLORAS.

A white or grayish-white crystalline powder, readily soluble in water, obtained by the action of concentrated hydrochloric acid on morphine. A reliable emetic.

Internally, employed in powder, pill, or less frequently in solution, as the latter, unless mixed with syrup and kept from the air, turns a greenish color. The maximum dose is $\frac{1}{3}$ grain; $1\frac{1}{2}$ grain pro die.

1. As an expectorant in doses of $\frac{1}{60}$—$\frac{1}{30}$ grain (proportion-

ately smaller doses for children) in powder, pill, or solution (the latter to be kept in a colored bottle), in the treatment of severe bronchial catarrh (with the addition of morphine for the cough), tracheitis, and pneumonia. When given in aqueous solution, a few drops of hydrochloric acid should be added.

2. As an emetic, in doses of $\frac{1}{6}$ grain for adults, proportionately less for children.

Subcutaneously it is given: (*a*) As a certain and speedy emetic (within ten to twenty minutes), which does not cause nausea, and produces no general symptoms, in doses of $\frac{1}{30}$ to $\frac{1}{12}$ grain for children, and $\frac{1}{12}$ to $\frac{1}{6}$ grain for adults. This mode of administration is to be preferred in all cases in which an emetic is indicated, but in which its internal administration is difficult, as in laryngeal croup and in narcotic poisoning, or where the use of the stomach pump is inadvisable.

b. For cutting short epileptic attacks. A hypodermic injection should be given immediately upon the appearance of the aura.

Given by the rectum, apomorphine is emetic in doses of $\frac{1}{6}$ to $\frac{1}{4}$ grain.

℞ Apomorph. hydrochlor., ... gr. iss.
(for children, gr. $\frac{1}{3}$)
Aq. destillatæ, ... ʒ iiss.

M. To be kept in a colored glass bottle. S. From 8 to 15 drops to be injected beneath the skin of the arm. (Emetic.)

℞ Apomorph. hydrochlor., ... gr. i.
Pulv. glycyrrhizæ,
Extr. glycyrrhizæ, ... āā ʒ i.

M. et ft. pil. No. 50. S. One to three pills every hour or two. (Expectorant.)

℞ Apomorph. hydrochlor., . . . gr. ss.
Morphin. hydrochlor., ... gr. iss.
Aq. destillatæ, ... ℥ v.

M. To be kept in a dark-colored battle. S. A tablespoonful every two to four hours. (Expectorant.)

℞ Apomorph. hydrochlor., ... gr. $\frac{1}{6}$
Syr. althææ, ... ʒ iiss.
Aq. destill., ... ʒ iv.

M. S. Twenty drops every hour, as an expectorant for children; as an emetic, one teaspoonful.

AQUA AMYGDALÆ AMARÆ.

See Amygdala Amara.

AQUA CARBOLISATA.

See Acidum Carbolicum.

AQUA CHLORI.

Chlorine water is a four per mil. solution of chlorine gas in water. It is an antiseptic with slightly escharotic action; in the presence of organic molecules, it forms hydrochloric acid, drawing its oxygen from them, and thus acts as a powerful poison to the lower forms of animal and vegetable life, destroying putrid matters and removing the odor.

Internally, in doses of ʒ ss.–i. in syrup and water, it is given to prevent fermentation in the stomach and small intestine; also in typhoid fever and other infectious diseases.

Externally it is used as a disinfectant mouth wash and gargle (1 part to from 2 to 5 of water), for application to the pharynx (mixed with equal parts of syrup), in dressings, for washing infected bed-clothing, etc. (diluted with equal parts of water), for bathing (1 quart added to the bath), and by enema for the destruction of thread-worms (in doses of one tablespoonful diluted).

Fumigatio Chlori.—Chlorine vapor for disinfecting purposes may be obtained by adding 2 parts of a fifty per cent solution of crude sulphuric acid to 1 part each of common salt and peroxide of manganese. A milder fumigation may be obtained by adding vinegar to a thin paste of chloride of lime and water. Chlorine gas is very irritating to the respiratory organs. See also Liquor Sodæ Chloratæ.

ARAROBA.

See Chrysarobinum.

ARBUTIN.

See Uva Ursi.

ARGENTI NITRAS.

(Pencils made of 1 part of nitrate of silver and 2 parts of nitrate of potassium are less brittle than those of the pure nitrate of silver.) The stains on the skin and clothing caused

by nitrate of silver may be removed by concentrated solutions of iodide or cyanide of potassium.

An astringent (antiphlogistic caustic) and antispasmodic.

It coagulates albumin and causes contraction of the blood-vessels.

Internally it is employed in doses of $\frac{1}{12}$ to $\frac{1}{2}$ grain (the maximum dose) from one to three times a day in pills (with alumina), lozenges (with chocolate), but best in simple aqueous solution (gr. iv. to distilled water ℥ i.) in doses of 10 to 60 drops, or in a solution of gr. iv. to distilled water ℥ iij., in doses of one-half to one teaspoonful. The solution causes a staining of the lips and teeth. To prevent argyria, the total amount of the drug employed should not exceed half an ounce.

1. In diseases of the digestive organs (in solution); in diarrhœa, especially of children, chronic intestinal catarrh, tuberculosis of the intestines, ulcer of the stomach, dysentery, and typhoid fever (in the last two cases also by enema), and in all forms of cardialgia.

2. In nervous diseases, at the present time only in epilepsy (occasionally it is curative but usually only palliative) and tabes dorsalis.

The antidote in cases of acute poisoning is common table salt.

Externally nitrate of silver is used: (*a*) In the abortive treatment of quinsy (caustic), in chronic conjunctivitis (one-half to one per cent solution), as a prophylactic against ophthalmia neonatorum; in gonorrhœal conjunctivitis; in soft chancre and panaritium (in the last two cases the parts must be energetically treated with the solid stick).

b. In subacute and chronic catarrh of almost all the accessible mucous membranes, in a one to five per cent solution (for laryngeal applications, a powder composed of 1 grain nitrate of silver in 15 to 60 grams sugar may be insufflated); and also in ulcers of the mucous membranes, but a caustic effect must be shunned in diphtheria.

c. In painful burns of the second and third degrees an application may be made of 1 part nitrate of silver in from 1 to 5 of water; after the formation of an eschar, the pain subsides, and the danger of union of the opposing surfaces is obviated.

d. In sluggish ulcers, with bleeding or exuberant granula-

tions, nitrate of silver may be used either as a caustic or as a dressing (in one to two per cent solution).

e. In gonorrhœa, nitrate of silver is employed in injection (as an astringent, 1 to 2 grains to the ounce; or as an abortive agent, 2 grains to the drachm); in vaginal gonorrhœa, a solution of 1 to 1½ grains to the ounce is of the proper strength.

f. In orchitis and epididymitis, the scrotum may be painted with a strong solution (100 grains to the ounce), the patient resting in bed and having the scrotum supported on a cushion. In dysentery and typhoid fever, rectal injections of 1 to 4 grains in solution may be given.

℞ Argenti nitratis, ... gr. ss.–iss.
Glycerini, ... ʒ v.
Aq. destillatæ, ... ʒ xx.

M. Keep in colored glass bottle. S. A teaspoonful every two hours. (Infantile diarrhœa, cardialgia, gastric ulcer.)

℞ Argenti nitratis, ... gr. iv.–viij.
Boli albæ, ... gr. lxxv.
Aq. destill., ... q.s.

M. et ft. pil. No. 50. S. One or two pills after meals. (Locomotor ataxia, epilepsy, gastric ulcer.)

℞ Argenti nitratis, ... gr. iss.
Aq. destillatæ, ... ℥ v.

M. Keep in black glass bottle. S. One to two tablespoonfuls fasting, for gastric ulcer.

℞ Argenti nitratis, ... gr. xv.
Aq. destillatæ, ... Oij.

M. Keep in black glass bottle. S. For washing out the bladder in cystitis.

℞ Argenti nitratis, ... gr. viij.–xv.
Bals. peruviani, ... ʒ i.
Ung. zinci oxidi, ... ʒ iiss.

M. et ft. unguentum. S. Ointment for syphilitic ulcers when cicatrization is delayed.

℞ Argenti nitratis, ... gr. iss.
Aquæ destillatæ, ... ℥ iss.

M. Keep in colored glass bottle. S. For inhalation once a day in pertussis, the patient being kept in a room at an even temperature. A narcotic to be given at night.

After eight or ten days all the characteristic symptoms should have disappeared.

ARGILLA.

See Bolus Alba.

ARISTOLUM.

Antiseptic.—A combination of iodine and thymol. A reddish-brown powder insoluble in water and gycerin, slightly soluble in alcohol, but readily soluble in ether. A good succedaneum for iodoform, as it favors cicatrization and is, moreover odorless and non-toxic.

Externally employed in three to ten per cent ointment with vaselin as an application to varicose ulcers, parasitic eczema of the thighs, lupus exulcerans, soft chancre, psoriasis, mycosis capillarum, and tertiary syphilitic ulcers. For insufflation (pure powder) in rhinitis, naso-pharyngitis, laryngitis, and specific ozæna; after the insufflation, a tampon impregnated with a ten-per-cent ointment should be passed into the nostrils.

ARNICA.

Internally employed (rarely) as a nervous stimulant in infusion (5 to 15 parts in 150), or in powder in doses of 5 to 15 grains.

Externally employed in enemata, and for making cataplasms (5 to 20 parts in 100).

Tinctura Arnicæ.—This is the form in which the drug is most commonly employed. It is used as an application to injuries of all kinds, in pure tincture, to small wounds and contusions; in compresses, mixed with brandy or lead water; and in embrocations in contusions, rheumatism, and paralyses.

ARSENICUM ALBUM.

See Acidum Arseniosum.

ASAFŒTIDA.

A nervine employed as a symptomatic remedy in hysterical attacks. Many hysterical patients, however, exhibit an idiosyncrasy in regard to asafœtida, convulsive paroxysms being excited by it, and the initial doses should therefore be small.

Internally, in doses of 3 to 15 grains or more several times a day in pills or bits of the gum (with the addition of a small quantity of mucilage or alcohol), which should be coated with gelatin on account of the disagreeable odor.

By enema in doses of ¾ to 2 drachms, with the yolk of one egg, mixed in ℥ iss.–v. of fluid. This is the most common mode of administration.

Tinctura Asafœtidæ.—Dose for internal administration, 20 to 60 drops. It is also used for inhalation in hysterical hallucinations of smell.

℞ Asafœtidæ, ... ℥ iss.
Alcoholis, ... q. s.
M. et ft. pil. gelatin. No. 60. S. Three pills three times a day.

℞ Asafœtidæ, ... gr. lxxv.
Aceti, ... Oij.
M. S. To be added to enemata. (Vinegar acts as a stimulant to the rectum.)

℞ Tinct. asafœtidæ, ... ℥ iij.
Tinct. castorei canadensis,
Ætheris,
Tinct. opii camphoratæ, . . āā ℥ iss.
M. S. Fifteen to 20 drops two or three times a day. (In convulsions, especially hysterical in nature.)

℞ Asafœtidæ, ... ℥ ss.–i.
Vitello ovi unius
M. sensim terendo cum
Infus. valerian., ... ℥ iv.
Fiat emulsio. S. Sufficient for two clysters.

ASEPTOLUM.

Aseptol or sozolic acid is prepared by mixing phenol with concentrated sulphuric acid in the cold, and neutralizing with barium carbonate. It is a syrupy, reddish-brown fluid, miscible in all proportions with water, alcohol, and glycerin. (Becomes unfit for use after being kept for any length of time.)

Externally employed in ten-per-cent aqueous solution in the same manner as carbolic and salicylic acids, of which it possesses the antiseptic but not the irritant and toxic proper-

ties. It is said that it is an efficient antiseptic in a solution of even 1:1,000.

ASPARAGINUM.

Internally employed in doses of gr. i.–iss. (maximum daily dose, gr. v.) in powder, pill, or solution several times a day, as a diuretic.

ASPIDIUM.

Filix mas, male fern, is a good remedy for tape-worm, which affects the stomach but little.

Internally employed in two or three doses of 80 grains of the powdered root taken at intervals of fifteen to thirty minutes, in water, black coffee, or electuary, and also in mixture with pomegranate root; an hour after the last dose a half-ounce of castor oil should be taken (*conf.* Brayera). It is usually employed in the form of an extract or of the

Oleoresina Aspidii.—Given in doses of ʒ i.–ij. for adults in beef tea, coffee, or capsules. The patient should eat nothing the evening before except a little oatmeal water, and should take a teaspoonful of Epsom salts. In the morning, fasting, he should take 1 to 2 drachms of the oleoresin (warmed) at one dose, followed in an hour by a tablespoonful of warmed castor oil; if the bowels are not freely moved in a couple of hours, some more Epsom salts should be taken in a cup of wormwood tea. For children ½ to 1 drachm may be given in divided doses at short intervals, mixed with sugar, rum, or fresh lemon juice. The following formulæ are strongly to be recommended:

℞ Oleoresinæ aspidii,
Chloroformi, ... āā ʒ i.
Emulsion. ol. ricini (Ol. ricini, ℥ iss.), . . ℥ iij.
M. S. To be taken at one dose after a twenty-four-hour fast.

℞ Oleoresinæ aspidii, ... ʒ i.
Acaciæ, ... ʒ ss.
Syr. simplicis, ... ℥ ss.
Aq. destillatæ, ... ℥ iss.
M. S. To be taken in divided doses within a half-hour, and to be followed in fifteen minutes by one or two tablespoonfuls of castor oil.

ATROPINA.

See Belladonna.

AURANTIUM.

Unripe oranges are similar to orange peel, but contain also citric acid and tannin. They are employed as an aromatic stomachic bitter, macerated in wine (1 part to 10 or 15) or in liqueur (Curaçao), or dried and powdered, mixed with valerian and lemon-balm leaves, as a tea.

Aurantii Cortex.—Orange peel is used in the preparation of the following:

Tinctura aurantii.—One part orange peel, 5 parts alcohol. Dose, ♏ xv.–ʒ i.

Employed in dose of 20 to 80 drops in water, pure or with tincture of rhubarb, etc.; a favorite ingredient of stomachic mixtures.

Elixir aurantii compositum contains 20 parts finely cut bitter-orange peel with various bitters in 100 parts of sherry wine, with a little carbonate of potassium added. Dose, ʒ ss. –ʒ i.

Syrupus aurantii corticis is an elegant preparation, containing some alcohol, which is frequently employed as an ingredient of various mixtures, and may also be given pure to children.

Aurantii Flores.—*Oleum aurantii florum* is used for making elixirs, syrups, etc.; an oil-sugar is also made with it.

Aqua aurantii florum (aqua naphæ) is employed as a flavoring ingredient, and, for its odor, in various pharmaceutical preparations.

AURI CHLORIDUM.

Externally employed as a caustic. It is an ingredient of Landolfi's caustic for cancer.

AURI ET SODII CHLORIDUM.

A golden-yellow powder, completely soluble in 2 parts of water, but imperfectly soluble in alcohol.

Internally employed, in doses of $\frac{1}{12}$ grain several times a day (up to a maximum dose of 3 grains pro die), in aqueous

solution (kept in colored glass bottles) or pill, in the treatment of epilepsy, locomotor ataxia, and syphilis.

Externally used as a collyrium in solution (⅛ to 1 grain to the ounce), or in ointment in the proportion of gr. ss.–iij. to ℥ ss.

BALSAMUM COPAIBÆ.

See Copaiba.

BALSAMUM GURJUNÆ.

Gurjun oil or gurjun balsam (balsamum dipterocarpi), from Dipterocarpus trinervis.

Internally employed instead of copaiba in doses of 10 to 30 drops, three or four times a day, pure or with peppermint water, in the treatment of gonorrhœa, non-specific urethritis, and elephantiasis.

Externally used, in the form of liniment (1 part to 3 of lime water), in the treatment of scaly diseases of the skin, and especially of leprosy. The diseased parts should be rubbed with the balsam for one hour, morning and evening, after a bath.

℞ Bals. gurjunæ, ... ℥ ij.
Gum. acaciæ, ... ℥ iiss.
Syr. acaciæ, ... ℥ i.
Aq. menth. pip., ... ℥ iss.
M. S. To be taken in three doses, for urethritis.

BALSAMUM NUCISTÆ.

See Myristica.

BALSAMUM PERUVIANUM.

A balsam having an agreeable odor, but a sharp, bitterish taste.

Internally employed, instead of balsam of copaiba, in doses of 5 to 25 drops several times a day in capsules, pills, or emulsion (5 or 10 parts, with half the amount of gum arabic, in 150 of the emulsion).

It diminishes the secretion, like copaiba, but is weaker and milder in its action than the latter; it is also expectorant, and is especially indicated in bronchorrhœa. It is often well borne in cases in which patients cannot take copaiba.

Externally.—1. An excellent remedy for itch, killing both the mites and their eggs. In the morning from 3 to 4 drachms, pure or more rarely diluted with alcohol, should be well rubbed over the entire body, with the exception of the head, and then in the evening a bath with warm water and soap should be taken. The application may be repeated in twenty-four to forty-eight hours.

2. In the treatment of wounds, sore nipples, ulcers, burns, frost bites, and chilblains, balsam of Peru, in ointment, cerate, or liniment, acts as a slightly stimulating protective dressing.

3. For pencilling the parts in diphtheria and ozæna, it is used mixed with turpentine and thinned with alcohol. This mixture may also be made into an emulsion with the yolk of an egg, for internal use.

4. It has been recommended for the treatment of tuberculosis by intravenous injection of an emulsion made with almond oil and mucilage of acacia (1 part to 400 or 500).

Syrupus Balsami Peruviani.—Contains 1 part of Peruvian balsam in 40 of syrup. Is used in expectorant mixtures.

Mistura Oleoso-balsamica (Hoffmann's balsam of life).—Contains 3 parts balsam of Peru and 1 part each of the volatile oils of clove, cinnamon, lavender, orange flower, thyme, mace, and lemon, in 240 parts of alcohol.

Internally employed as a stimulant-expectorant in doses of 10 to 20 drops in wine or dropped on sugar, several times a day.

Externally for inhalation, and as an elegant stimulant embrocation, wash, and cosmetic.

℞ Bals. peruv., ... ʒ i.–iiss.
Gum. acaciæ, ... ʒ i.
Aq. aurant. flor., ... ℥ v.
Syr. bals. peruv., ... ʒ v.
M. S. One tablespoonful (after shaking the bottle) every two hours, in bronchial catarrh with profuse secretion.

℞ Bals. peruv.,
Sodii biboratis, ... āā ʒ i.
Vitell. ovi unius
Ol. amygdal. dulcis, ... ℥ i.
M. et ft. linimentum. S. For application to sore nipples. Shake the bottle before using.

℞ Bals. peruviani, ... ʒ i.
Mist. oleoso-balsam., ... ʒ v.
Spir. odorati, ... ℥ i.
M. S. For application to pernio of the first degree.

℞ Mist. oleoso-balsam.,
Spir. formicarum, ... āā ℥ ss.
M. S. Liniment for rubbing the parts in rheumatism, paralysis, etc. (Spiritus formicarum contains formic acid, 4 parts; water, 26 parts; and alcohol, 70 parts.)

1. ℞ Balsam. peruviani,
Ol. ricini, ... āā ʒ vi.
M.
2. ℞ Styracis liq.,
Ol. olivæ, ... āā ʒ xij.
M.

Mix 1 and 2 while stirring, to make a liniment. S. For itch.

BALSAMUM STYRACIS.

See Styrax.

BALSAMUM TOLUTANUM.

A brownish-yellow, brittle, resinous mass, easily beaten into a yellow powder, having an agreeable odor and slightly acid, aromatic taste.

Internally employed, to meet the same indications as balsam of Peru, in doses of gr. iij.–xv. several times a day in pills, capsules, or emulsion. It has been recommended in combination with creasote in the treatment of pulmonary phthisis.

Externally used, with balsam of Peru, as a remedy for scabies.

℞ Bals. tolutani,
Creasoti, ... āā ʒ i.
Pulv. althææ, ... q.s.
M. et ft. pil. No. 60. S. One pill three times a day. (Phthisis.)

BARII CHLORIDUM.

[*Internally,* in doses of one to two teaspoonfuls three times a day of a solution of 5 grains to the ounce of water, in weakened cardiac action.]

Externally, as a collyrium and in dressings (varicose veins) in a solution of ½ to 2 parts in 100 of water.

BELA.

Bael fruit, Bengal quince. A demulcent astringent.

Internally employed in decoction, and recommended in the treatment of diarrhœa.

Extractum Belæ Liquidum.—A preparation of the B. Ph., employed like the decoction in diarrhœa and dysentery.

℞	Ext. belæ liq., ...	℥ v.
	Tr. opii, ...	ʒ ss.
	Syr. simp., ...	ʒ v.

M. S. One tablespoonful every two hours. (For diarhœa, especially the diarrhœa of phthisis.)

BELLADONNA.

A narcotic (having a cumulative action) which paralyzes the motor oculi muscle, first stimulates and then paralyzes the brain and spinal cord, reduces the excitability of the peripheral sensory nerves, especially of the vagus terminations in the lungs and heart (increasing the rapidity of the pulse), and causing increased blood pressure, contracting the arterioles. The first symptoms of poisoning are: dilatation and fixedness of the pupils, disturbed vision, delirium, a rapid pulse and dryness of the throat; the latter symptom is due to the arrest of the salivary secretion in consequence of paralysis of the chorda tympani nerve.

Belladonnæ Folia.—*Internally* employed (rarely) in doses of gr. ss.–iij. once or twice a day in pill, powder, or infusion (½ to 1 part in 100).

1. In cardialgia, nervous vomiting, neuralgia, and spasmodic affections of various kinds; and smoked in cigarettes for asthma.

2. Empirically, in habitual constipation and indigestion associated with a sluggish condition of the lower bowel. Belladonna seems to increase the peristaltic movements and to quiet the colicky pains.

Extractum Belladonnæ.—*Internally* employed in doses of ⅙ to ¾ gr. two or three times a day, in powder or pill, for

gastralgia and lead colic. In rebellious obstipation it is sometimes given in several large doses of one grain each every hour or two.

Externally used in ointments and liniments (1:10) in painful spasmodic muscular contractions, especially of the sphincters; locally as an anodyne in neuralgia and pain of all kinds. In watery solution (one-half to one and one-half per cent) it is used as an eye-wash. It is administered also in enemas (gr. i.–xv. in ʒ iij.–v.) and in suppositories (gr. $\frac{1}{6}$ to ʒ ss. cacao butter).

Atropinæ Sulphas.—*Internally* given in doses of gr. $\frac{1}{200}$ to $\frac{1}{60}$ (maximum dose, $\frac{1}{20}$ gr. pro die) in pill, powder, or solution, for convulsions, whooping-cough, epilepsy, chorea, for the night sweats of phthisis, and for the hyperidrosis of acute rheumatism.

Externally used to dilate the pupils in solution (gr. ss.–i. in ʒ ij.), in ointment (gr. $\frac{1}{3}$ to $\frac{3}{4}$ in ʒ ij.), or in gelatin disks (each containing $\frac{1}{40}$ grain) which can be readily placed in the eye by taking up on the end of a moist camel's-hair pencil.

Subcutaneously employed for the indications given above; recommended especially in pulmonary and other forms of hemorrhage in doses of gr. $\frac{1}{300}$ to $\frac{1}{128}$, also in the same dose for convulsions, neuralgia, myalgia, and rheumatic pains.

Homatropinæ Hydrobromas.—Employed as a mydriatic (gr. ss.–iss. in ʒ iiss. water), the paralysis of accommodation being of shorter duration than that produced by atropine; the drug is also much less liable to produce a systemic toxic effect.

Antidotes in atropine poisoning are opium and calabar bean. On the other hand, atropine is itself an antidote to mushroom poisoning.

℞ Pulv. belladonnæ fol., ... gr. viij.
Bismuthi subnitratis, ... gr. iv.
Elæosacch. matricariæ, . . . gr. lxxx.

M. et div. in chart. No. x. Keep in waxed paper. S. One powder every three hours. (Cardialgia.)

℞ Extr. belladonnæ, ... gr. iv.
Aq. amygdal. amaræ, ... ℥ ss.

M. S. Thirty drops three or four times a day. For children, 3 to 10 drops. (Cardialgia, irritable cough, pertussis.)

℞ Atropinæ sulph., ... gr. $\frac{1}{6}$
Morphinæ sulph., ... gr. iij.
Pulv. glycyrrhizæ,
Ext. glycyrrhizæ, ... āā q.s.
M. et ft. pil. No. 20. S. One pill two or three times a day. (Colic, lead colic.)

℞ Atropinæ sulph., ... gr. $\frac{1}{6}$
Aq. destillatæ, ... ʒ iiss.
M. S. For hypodermic injection in dose of 8 to 15 drops. (Epilepsy, hydrophobia, morphine poisoning, and hæmoptysis.)

℞ Extr. belladonnæ, ... gr. iv.
Liq. ammonii anisati, ... ʒ ss.
Aq. destillatæ, ... ℥ ss.
M. S. Ten to 20 drops even hour. (Spasmodic cough.)

℞ Atropinæ sulphatis, ... gr. $\frac{1}{12}$.
Extr. gentianæ, ... q.s.
M. et ft. pil. No. 10. S. One or at most two pills at night. (Night sweats of phthisis, epilepsy.)

℞ Atropinæ sulph., ... gr. $\frac{1}{6}$
Pulv. rhei,
Ext. gentianæ, ... āā gr. xlv.
M. et ft. pil. No. 30. S. One to three pills at night. (Cardialgia.)

℞ Atropinæ sulph. . . . . gr. $\frac{1}{6}$
Morphinæ sulph., ... gr. iss.
Aq. destillatæ, ... ʒ iiss.
M. S. Eight to 15 drops hypodermically. (Neuralgia, migraine, sciatica.)

℞ Atropinæ sulph., ... gr. i.–iss.
Aq. destillatæ, ... ʒ iiss.
M. S. Poison. For *external use*, with care. (For dropping in the eye to dilate the pupil.)

BENZINUM.

Internally in doses of 20 to 30 drops once or twice a day, in a mucilaginous mixture, or better in capsules, for the relief of fermentative processes in the stomach (dilatation of the stomach) and chronic intestinal catarrh, and for the destruction of trichinæ in the intestine; in the latter case to be com-

bined with repeated rectal injections of 30 drops of benzin in water.

Externally (1 part to 3 of lard) for the destruction of parasites, especially of the itch-mite. (It is irritating to the skin; and is also very combustible, so must be kept away from fire.)

In pediculosis capitis, the scalp should be rubbed thoroughly with benzin and then covered with cotton and gutta-percha tissue.

For the destruction of thread-worms, injections may be used of two teaspoonfuls in a quart of water.

BENZOINUM.

See Acidum Benzoicum.

BENZOLUM.

A thin fluid obtained from coal tar. Benzene (not to be confounded with benzin, obtained from petroleum).

Internally employed in emulsion or capsules (in doses up to ʒ iss. pro die) in trichiniasis.

Externally in the form of ointment in various affections of the skin, especially scabies.

℞ Benzoli, ... ʒ iss.
Mucil. acaciæ, ... ʒ vi.
Ext. glycyrrh., ... ʒ ij.
Aq. menth. pip., ... ℥ iij.

M. S. A tablespoonful (after shaking the bottle) every hour or two, in trichiniasis.

℞ Benzoli, ... ℥ i.
Adipis, ... ʒ iss.

M. et ft. unguentum. S. For external use, in scabies and other skin affections.

BISMUTHI SUBNITRAS.

A mild, somewhat emollient, protective astringent, which interferes in no way with nutrition. It is a remedy which is highly prized by many and considered worthless by others (*conf.* Sodii Bicarbonas).

Internally it may be given in doses of gr. iss.–xv. several times a day in powder or pill, often combined with opium, morphine, or belladonna.

1. In cardialgia from various causes, chronic gastric and intestinal catarrh, pyrosis, gastric and intestinal ulcers, etc.

2. In cholera infantum, in hourly doses of 3 to 6 grains, it is regarded by many as almost a specific; in the diarrhœa of phthisis, dysentery, and intestinal ulceration it may be given in doses of 15 grains every hour or less frequently.

Externally it is employed pure as a dusting powder or mixed with sugar (1:5) as a drying-powder for the nose, pharynx, or larynx; in suspension (4 to 10 parts to 100) as an injection in gonorrhœa; and as an ointment (1 to 3 parts to 25 of vaselin) in eczema, burns, and other wounds.

(The too free use of bismuth has caused toxic symptoms similar to those of mercury.)

Bismuthi Subcarbonas, Citras, and Tannas.—These salts are employed in the same way and for the same purposes as the above.

Bismuthi Bromas and Valerianas.—Employed like the subnitrate, sometimes preferably, in nervous gastric disorders.

Bismuthi Oxyiodidum.—A reddish insoluble powder.

Internally employed in powder in doses of gr. iss.–iij. several times a day in ulcer of the stomach and typhoid fever.

Externally used as a dusting-powder and in ointment like the subnitrate; and in suspension in water (1:100) as an injection in gonorrhœa.

Bismuthi Salicylas.—*Internally* employed in doses of gr. v.–xv. to meet the same indications as the subnitrate, more particularly in the diarrhœa of phthisis (gr. viij. every two or three hours), in typhoid fever (gr. xv.–xxx. several times a day), and in chronic gastric and intestinal disorders. Is well borne by the stomach and can be employed for longer periods than the subnitrate.

℞ Bismuthi subnitr.,
Ext. valerianæ, ... āā ʒ i.
M. et ft. pil. No. 60. S. Five pills three times a day. (Nervous cardialgia.)

℞ Bismuthi subnitr., ... gr. xxiv.
Morph. hydrochlor., ... gr. i.
(Sodii bicarb., ... gr. xv.)
Sacch. albi, ... ʒ i.
M. et div. in chart. No. 10. S. One powder three times a day. (Cardialgia.)

℞ Bismuthi subcarb., ... ʒ iiss.
Sacch. albi., ... ʒ i.
Pulv. opii, ... gr. iss.
M. et div. in chart. No. 10. One powder an hour before each meal. (Diarrhœa from intestinal ulceration.)

℞ Bismuthi subnitr., ... ʒ iiss.
Zinci oxidi, ... ʒ ss.
Glycerini, ... ʒ ij.
Acidi carbol., ... gtt. xx.
Vaselin. alb., ... ℥ i.
M. et ft. unguentum. (Eczema of children.)

℞ Bismuthi subnitr., ... ʒ i.
Liq. calcis, ... ʒ iss.
Aq. fœniculi, ... ℥ iiss.
Syr. aurant. cort., ... ℥ ss.
M. S. A teaspoonful every two hours. (Diarrhœa of children.)

BLATTA ORIENTALIS.

Called also pulvis taracanæ, powdered cockroach. Diuretic (a domestic remedy for dropsies).

Internally given in doses of 1 to 15 grains several times a day in powder; also in teaspoonful doses of a cold infusion (ʒ ij. : ℥ iij. of water).

BLAUD'S PILLS.

See Ferri Sulphas.

BOLETUS LARICIS.

See Agaricus Albus.

BOLUS ALBA (*Argilla*).

Internally employed as an excipient for pills containing salts which are readily decomposed by organic matters, such as nitrate of silver, bichloride of mercury, etc.

Externally as an ingredient of dusting-powders, tooth powders, etc.

BORAX.

See Sodii Boras.

BOROCITES.

See Magnesii Borocitras.

BRAYERA.

More commonly called kousso, is a tolerably certain anthelmintic for tape-worm.

For a few days preceding the administration of the remedy the patient lives on a rather spare meat diet, avoiding black bread, eggs, vegetables, and fruit, but selecting rather acid things such as onion salad, pickles, herring, etc. On the evening before the treatment is to be begun, he eats only a herring salad with onions, and on the following morning takes a cup of well-sweetened black coffee. Then he takes two powders of ʒ iiss.–iv. each of kousso, half an hour apart, in red wine, lemonade, sweetened water, or rum and water, or twenty to thirty lozenges containing 15 grains each of the drug, or the same amount in electuary, keeping very quiet in the mean while to prevent vomiting. For the nausea and to prevent vomiting a little lemon juice may be taken. If the bowels do not move within three hours after the last dose, half an ounce of castor oil or a dose of St. Germain tea (see Senna).

Kosinum Amorphum (Bedall).—Occurs in the form of yellow crystals, but slightly soluble in water.

Internally employed in doses of gr. xv.–xxx. in wafers or pills twice within two hours.

Kosinum Crystallisatum (Merck).—*Internally* employed in doses of gr. viij.–xv. in powder or pills, two or three times within an hour or an hour and a half.

℞ Brayeræ,
Mel. despumat., ... āā ʒ v.
M. et ft. electuarium. S. Take in two portions within one hour.

℞ Brayeræ, ... ℥ i.
Kamalæ, ... ʒ ss.
Ext. aspidii, ... ʒ i.
Mel. despumat., ... q.s.
M. et ft. boli No. 60. S. Take ten or twelve in the evening, and thirty the following morning.

BROMALI HYDRAS.

Internally employed in doses of gr. i.–viij. or more several times a day in pills and solution, in the treatment of epilepsy, chorea, and tabes dorsalis.

℞ Bromali hydrat.,
Ext. glycyrrhizæ, ... āā ʒ ss.
M. et ft. pil. No. 30. S. Two or three pills from one to three times a day. For children, about half the quantity.

℞ Bromali hydrat., ... gr. xv.
Mucil. acaciæ,
Syr. rubi idæi, ... āā ℥ iss.
Aq. destillatæ, ... ℥ iv.
M. S. A tablespoonful three times a day.

BROMOFORMUM.

A colorless fluid, very slightly soluble in water, but readily soluble in alcohol, which is rapidly volatilized by lamplight, giving off the vapor of bromine; when the fluid has a red color, it is decomposed.

Internally it has been strongly recommended for whooping-cough, given pure in drop doses in a teaspoonful of water for a child three or four weeks old, three or four times a day; for older nurslings, 2 to 3 drops three times a day according to the intensity of the affection; for children two to four years of age, 4 or 5 drops three or four times a day; for children from five to seven years old, 6 or 7 drops three or four times a day. On account of the volatility of the liquid, not more than a drachm should be ordered at a time, and the bottle should be kept tightly corked and away from the light.

BROMUM.

A dark, brownish-red, volatile liquid, soluble in 30 parts of water, very soluble in alcohol, ether, and chloroform. It gives off a yellowish-red vapor. It should be prescribed only in aqueous solutions of bromine, iodine, or chlorine salts.

Internally employed (rarely) in doses of 5 to 15 drops of a one-per-cent solution several times a day, in diphtheria and croup.

Externally in one-quarter to one-half per cent solution for painting diphtheritic membranes, and as an antiseptic in fomentations (one-half-per-cent solution) and ointment (one to two per cent).

It is also given by inhalation in diphtheria and croup.

℞ Bromi, ... ♏ iss.
Potass. bromidi, ... gr. iv.
Aq. destillatæ, ... ℥ iv.

M. S. One teaspoonful every hour in a little water, at the same time with inhalations according to the other formula.

℞ Bromi, ... ♏viij.
Potass. bromidi, ... gr. viij.
Aq. destillatæ, ... ℥ viij.

M. Keep in a colored-glass bottle. S. A sponge moistened with the solution is placed in a tin funnel or pasteboard cone, and held under the nose for five or ten minutes every hour or two.

BROMUM SOLIDIFICATUM.

Diatomaceous earth saturated with bromine and inclosed in a tight vessel. For disinfection of rooms and other large but confined spaces, the vessel is opened, and the vapor of bromine allowed to escape and diffuse itself throughout the apartment.

BRUCINA.

See Strychnos Nux Vomica.

BUCHU.

Internally employed in powder of the leaves in doses of gr. xv.–xxv. three or four times a day, or in infusion (℥ i.–iv. in ℥ ij.–v.). Tablespoonful doses of the latter are given in the treatment of chronic affections of the urinary passages, cystitis, and protracted gonorrhœa; as a diuretic in dropsy; for impotence, lithiasis, etc.

BURSA PASTORIS.

Shepherd's purse, also called Capsella bursa pastoris.

Internally employed in infusion (three or four tablespoonfuls of the fresh herb to make two cups of tea, of which one is

to be taken morning and evening). A domestic remedy for hemorrhages.

BUTYL-CHLORAL HYDRAS.

Croton chloral hydrate. An analgesic.

Internally employed in doses of gr. iij.–viij. several times a day, in solution with the addition of glycerin or alcohol, in neuralgias of the head and face, toothache, trigeminal neuralgia, the pains of locomotor ataxia, angina pectoris, spasmodic and teasing coughs, and pertussis.

℞ Butyl-chlorali, ... ʒ ss.–i.
Spt. vini rectif., ... ʒ iiss.
Glycerini, ... ʒ v.
Aq. destillatæ, ... ℥ iv.

M. S. Three or four teaspoonfuls at a dose. (Facial neuralgias and toothache.)

℞ Butyl-chlor. hydrat., ... ʒ ss.–i.
Glycerini, ... ℥ i.
Syr. aurant. cort., ... ʒ v.
Aq. destillatæ, ... ℥ iij.
Ol. fœniculi, ... gtt. v.

M. S. A tablespoonful, to be repeated in five or ten minutes if necessary. (In tic douloureux and other neuralgias.)

CAFFEINA.

Similar to theine, and is also contained in guarana (*q. v.*). A cup of coffee made with ℥ ss. of the ground berry, or of tea from 80 to 120 grains of the leaves, contains about 2 grains of caffeine, but in these hot drinks one gets also the effects of the volatile and empyreumatic oils. See also Coffea and Guarana.

Caffeine is an alkaloid prepared from coffee and tea (cardiac tonic and diuretic), occurring in white, shining elastic needles, soluble in 80 parts of water, 50 of alcohol, and 9 of chloroform, but only slightly soluble in ether. It is used as a substitute for digitalis in most cardiac affections and also in nephritis, croupous pneumonia, and emphysema. It regulates the heart's action and causes the removal of œdema through increased diuresis. It is often effectual in cases where digi-

talis (which it cannot always replace) fails, and *vice versa;* it has the advantage of rapid action (its effects likewise rapidly disappear) and of possessing no cumulative effects. Its administration at the same time with narcotics, especially morphine, is not to be recommended.

Internally employed in doses of gr. i.–vi. (or gr. xij.–xxx. per day in divided, preferably hourly doses) in all cases in which digitalis may be indicated. For migraine and other forms of headache it may be given in powders of gr. i.–iij. several times a day. It has also been employed in small doses for insomnia, but is unreliable. It is given by subcutaneous injection (gr. xv.–xxx. in ʒ iss. of water) to meet the same indications as when internally employed. On account of their greater solubility (1 part in 2 of water), the double salts with sodium are to be preferred for hypodermic use.

Caffeinæ Citras, Hydrobromas, Sodio-benzoas, Sodio-cinnamas, and Sodio-salicylas.—The citrate of caffeine may be given in the same doses as the uncombined alkaloid (though not by hypodermic injection), but the double salts above enumerated contain only from 50% to 62.5% of caffeine, so that 5 grains of caffeine represent 10 grains of the sodio-benzoate, and 8 grains of the sodio-cinnamate and sodio-salicylate.

Æthoxycaffeina.—A narcotic sedative. Employed internally in doses of gr. iij.–viij. for facial neuralgia and migraine.

℞ Caffeinæ, ... gr. xv.
Pulv. guaranæ,
Sacch. albi, ... aa ʒ ss.
Mucil. acaciæ, ... q.s.
M. et ft. pil. No. 30. S. Two pills every half-hour, allowed to dissolve slowly in the mouth. (May be tried in hemicrania.)

℞ Caffeinæ citratis,
Extr. tritici, ... ää gr. viij.
M. et ft. pil. No. 10. S. One pill every two hours. (Hemicrania.)

℞ Caffeinæ sodio-benzoatis, ... ʒ ss.
Aq. destillatæ, ... ʒ iiss.
M. S. Fifteen to 30 drops by subcutaneous injection.

℞ Caffeinæ sodio-benzoatis, ... ʒ ss.–i.
Sacchari albi, ... ʒ i.
M. et div. in chart. No. 10. S. One powder three times a day. (Migraine, heart disease, dropsy.)

℞ Æthoxycaffeinæ,
Sodii salicylatis, ... āā gr. iv.
Cocainæ hydrochlor., ... gr. i.
Syr. simplicis, ... ʒ v.
Aquæ tiliæ, ... ℥ ij.
M. S. May be taken at one dose, for the relief of migraine or facial neuralgia.

CALAMUS.

Internally employed as an aromatic bitter in atonic dyspepsia, in doses of gr. viij.–xxx. several times a day in powder, or in five to ten per cent infusion.

Externally, sweet-flag is used in baths in the proportion of one-half to one pint of the infusion to the bath.

Tinctura Calami.—Given in doses of ʒ ss. or more several times a day as an ingredient in stomachic and nervine mixtures.

Extractum Calami.—*Internally* employed in doses of gr. iss.–viij. repeated several times a day.

Oleum Calami.—Used in doses of ½ to 2 drops added to tinctures, emulsions, or oil-sugars.

Mariazell Stomach Drops.—A tincture containing calamus, gentian, rhubarb, zedoary, anise, and fennel, each 10 parts; aloes, 5; benzoin, 7½; balsam of tolu, 10; and alcohol, 600.

℞ Infus. calami (rad., ʒ ss.), ... ℥ iij.
Gum. acaciæ, ... ʒ i.
Sacch. albi, ... ʒ ij.
M. S. One or two teaspoonfuls every two or three hours, in dyspepsia and diarrhœa of children.

℞ Infus. calami (rad., ʒ ij.), ... ℥ v.
Tinct. cinchonæ comp., ... ʒ i.
Acid. hydrochlor., ... ♏ xv.
Syr. cinnamomi, ... ʒ v.
M. S. A tablespoonful every two to three hours, in atonic dyspepsia.

CALABAR BEAN.

See Physostigma.

CALX.

Quicklime, oxide of calcium, caustic lime, is employed externally only, mixed with equal parts of caustic potash, as Vienna paste (potassa cum calce).

Liquor Calcis.—Lime water is an antacid and mild astringent, and is an absorbent for carbonic acid.

Internally employed pure in doses of ℥ ss.–v. several times a day; best in the morning, taken like mineral waters with equal quantities of warm milk, sweet whey, water, or meat broths. Children may take it with milk or sugar.

1. In pyrosis, chronic diarrhœa, especially that of children caused by acid fermentation of food or due to intestinal ulceration. As lime water forms an insoluble soap with the fatty acids, it furnishes an excellent protection to ulcers of the intestine or of the skin, under which cicatrization can take place as beneath a plaster.

2. In cystitis, pyelitis, rachitis, and osteomalacia.

Externally—(*a*) Sprays and gargles of lime water are useful in phthisis or pharyngitis with tough adherent mucous secretion, and in diphtheria and croup; for this purpose it may be used pure or mixed with equal parts of water with the addition of $\frac{1}{10}$ part glycerin or one per cent carbolic acid; it appears to be the best solvent we possess for the pseudo-membrane. It may also be found useful by enema in dysentery.

(*b*) In burns (equal parts lime water and linseed oil with a little carbolic acid), profusely suppurating ulcers, moist skin eruptions, etc.

CALX CHLORATA.

A disinfectant, employed only externally and in sprays and vapor. Chloride of lime is wet with weak vinegar, and old cloths dipped in the solution are hung up on lines about the room. For washing the effects of a patient, a solution of ℥ vi.–xij. in a quart of water is employed. The powder may be added pure to fecal matters. For removing the cadaveric odor from the hands after dissection, a thin paste of chloride of calcium

with water, to which is added a little sulphuric or hydrochloric acid, may be used.

CALCII CARBONAS PRÆCIPITATUS.

Exists in crude form as creta (chalk) and also in conchæ præparatæ (burnt oyster-shells). Soluble only in water containing carbonic acid gas.

Employed as an antacid under the same conditions as lime water, and is to be preferred to other alkaline carbonates in diarrhœa, while it is contra-indicated when there is a tendency to constipation.

Internally employed in doses of gr. viij.–xxx. and more, several times a day, in powders, lozenges, and suspension, for pyrosis and rickets.

Externally as a dusting-powder, pure or mixed with charcoal, alum, camphor, or quinine, as a tooth powder, and as a liniment mixed with oil for burns.

℞ Calc. carb. præcip., ... ℥ ss.
Pulv. iridis flor., ... gr. xlv.
(Cocci, ... q.s.)
Ol. caryophyl., ... gtt. x.
Ol. bergamot., ... gtt. i.
M. S. Antacid tooth powder.

℞ Calcii carb., ... ʒ i.
Ferri carb., ... ʒ ij.
Sacch. lactis,
Elæosacch. fœniculi, ... āā ʒ ss.
M. et ft. pulvis. S. As much as can be taken on the end of a knife-blade three times a day. (Rachitis.)

℞ Calcii carb. præcip., ... ʒ i.
Aq. fœniculi, ... ℥ iij.
Syr. amygdalæ, ... ℥ ss.
M. S. A dessertspoonful every hour. Shake the bottle before using.

CALCII PHOSPHAS PRÆCIPITATUS.

Phosphate of lime, with the carbonate, occurs in bone and gives it its hardness.

Internally employed in conjunction with hygienic and

dietetic measures in the treatment of rickets, in doses of gr. viij.–xxx. several times a day in powder (it may be added to the food); for scrofulous and marasmic children to control the diarrhœa and vomiting; in tuberculosis, caries, delayed callous formation in fractures; and for pregnant and nursing women. It is soluble in carbonated water, solutions of common salt, and in acids; it is partially soluble, therefore, in the gastric juice, but, as the proportion of acid in the latter is too feeble to effect a complete solution, the drug is usually given in combination with lactic acid (syrup of the lactophosphate of lime).

℞ Calcii phos. præcip., ... gr. xlv.
Calcii carb. præcip., ... gr. xxx.
Ferri reducti, ... gr. viij.
Chocolate, ... q.s.

M. et ft. trochisci No. 30. S. One lozenge three times a day.

℞ Calcii phos. præcip., ... ʒ i.
Calcii carb. præcip., ... ʒ ij.
(Ferri lactatis, ... gr. xv.–xxx.)
Sacch. lactis, ... ℥ i.

M. et ft. pulvis. S. A level teaspoonful three times a day in the food.

CALOMEL.

See Hydrargyri Chloridum Mite.

CAMBOGIA.

Gamboge, a gum resin obtained from the Garcinia Hanburii (nat. ord. Guttiferæ). A drastic cathartic, employed in doses of gr. i.–vi. (maximum dose, gr. viij., or gr. xv. pro die), in emulsion or pill form, usually in combination with other remedies.

CAMPHORA.

A white, tough, crystalline mass or crystalline powder, very slightly soluble in water, but readily so in alcohol, chloroform, and ether, and readily pulverizable on the addition of a few drops of any one of these three substances.

In medicinal doses camphor is a stimulant to the brain and spinal cord, lowers the temperature, but does not act mea-

surably upon the heart. It is also expectorant and diaphoretic.

Internally employed in doses of gr. i.–v. in powder, pill, solution, or emulsion. (Camphorated oil—linimentum camphoræ, U. S. P.—contains 1 part of camphor to 4 parts of cotton-seed oil.)

1. As a stimulant in collapse occurring in the course of acute fevers, and in narcosis from opium, alcohol, or belladonna poisoning.

2. As an expectorant, similar to benzoin, and usually in combination with it.

3. For the relief of chordee in gonorrhœa.

Externally as a stimulant and antiseptic application to sluggish granulations, to local œdemas, bruises, and sprains unaccompanied by distinct inflammatory reaction. It is also added to pillows of aromatic herbs, usually in the form of some of its preparations. Small pieces of camphor covered with cotton and inserted in the external auditory canal are used in toothache. The addition of camphor to stiff plasters makes them more flexible.

Subcutaneously a solution of camphor in ether (1:5) or oil (1:4) acts as an energetic stimulant in asphyxia and collapse. If the oil is used, a hypodermic needle with tolerably large lumen should be selected.

Vinum Camphoratum.—Composed of camphor and alcohol, each 1 part; gum arabic, 3 parts; white wine, 45 parts. It is employed as a dressing to bed-sores and atonic ulcers.

Spiritus Camphoræ.—Composed of camphor, 1 part; alcohol, 7 parts; and water, 2 parts. Is employed chiefly externally.

For Camphorated Liniment of Ammonia and Camphorated Soap Liniment, see Ammoniæ Aqua.

℞ Camph. pulv., ... gr. v.–xxx.
Sacch. albi, ... ʒi.
M. et div. in chart. No. 10. S. One powder in a wafer every one to three hours.

℞ Camphoræ, ... ʒi.
Ætheris, ... ʒij.
M. S. Twenty to 30 drops in wine.

℞ Camph. pulv., ... ʒ ss.
Adipis, ... ʒ v.
Acid. hydrochlor. pur., ... ♏ xv.
M. et ft. unguentum. To be applied at night. (Chilblains.)

℞ Camphoræ, ... gr. xv.
Ætheris, ... ʒ ss.
Ol. olivæ, ... ʒ ij.
M. S. For use in hypodermic injection (15 to 30 drops).

℞ Camphoræ, ... ʒ ss.
Ergotæ, ... ʒ i.
Mucil. acaciæ, ... q.s.
M. et ft. pil. No. 50. S. One pill morning and night. (Pollutions, priapism, chordee.)

℞ Camphoræ, ... gr. xv.
Ol. olivæ, ... ʒ ij.
Mucil. acaciæ, ... ℥ v.
M. et ft. emulsio et adde
Syr. simplicis, ... ℥ i.
M. S. A tablespoonful every two hours.

℞ Camphoræ, ... gr. viij.
Acid. tannici, ... gr. xv.
Pulv. acaciæ, ... ʒ i.
M. et div. in chart. No. 10. S. One powder every hour or so, as required. (Cholera.)

CAMPHORA MONOBROMATA.

Internally recommended as a sedative in doses of gr. iss.–viij. in powder, pills, emulsion, or best in capsules (1½ grains each) in various forms of neuroses and neuralgia, but seems to be more especially efficacious in those conditions when associated with irritable conditions of the genito-urinary organs, and in palpitation of the heart.

CANNABIS INDICA.

Indian hemp in form of the herb is seldom employed, except in powder combined with the extract to make pill masses and in cigarettes for use in asthma. A preparation of the herb is sold in Eastern countries, under the name "hashish," and used as an intoxicant, but the medicinal employment of this

preparation, on account of its varying strength and unreliability, is not to be recommended. It is, however, sometimes burned, and the fumes inhaled for the relief of asthma.

Extractum Cannabis Indicæ.—A thick, dark green extract, insoluble in water. Maximum dose, 1½ grains, or 6 grains per day.

Internally employed in doses of gr. ss.–iss. two or three times a day in pill or emulsion as a hypnotic and sedative; but its effects, as those of all the preparations of cannabis indica, are so very uncertain, often negative, and sometimes alarming that it would be better to abandon the medicinal use of the drug. A single daily dose of ¼ to ½ grain, continued for a long period, has been highly recommended in the treatment of migraine.

Externally it is employed in ointments or liniments for the relief of local inflammatory, rheumatic, or neuralgic pains.

Tinctura Cannabis Indicæ.—*Internally* employed in doses of 10 to 30 minims, pure or diluted with some other tincture. The extract answers every purpose, and this preparation could readily be dispensed with.

Cannabinum Tannicum.—Given in doses of 10 to 20 drops (maximum dose ʒ ss. a day), as a hypnotic. It is an unnecessary preparation, yet it seems to have a reliable and not unpleasant action.

Cannabinonum and Balsamum Cannabis Indicæ are two preparations which have been used as hypnotics but are liable to produce unpleasant symptoms, and their use is not to be recommended.

℞ Ext. cannabis ind.,
Pulv. cannabis ind., ... āā gr. xv.
M. et div. in pil. No. 20. S. One or two pills at a dose. (Hypnotic.)

℞ Extr. cannabis ind., ... gr. iij.
Lin. ammoniæ camph., ... ʒ vi.
M. et ft. liniment. S. For external use in the pains of chronic rheumatism.

CANTHARIS.

Internally Spanish fly is employed in doses of gr. i. as a diuretic, emmenagogue, and aphrodisiac, but acts injuriously upon the kidneys, and is better not used. For poisoning with

cantharides give emetics and diluent drinks, but no oily fluids.

Externally employed in all the usual ways as a derivative, rubefacient, and vesicant, but caution must be exercised, as even the external application may cause strangury.

Cantharidinum.—The active principle of the drug, employed only in combination with potassium or sodium. (Dissolve 3 grains of pure cantharidin and 6 grains of potassa in 300 minims of water, over a water bath, and dilute to two pints. Fifteen minims contain $\frac{1}{330}$ grain.) It is recommended in doses of $\frac{1}{330}$ grain to at most $\frac{1}{55}$ grain by hypodermic injection in tuberculosis. (It was first used in tubercular laryngitis.) Larger doses of cantharidin cause serous exudations, even when the renal and pulmonary capillaries are normal; and the doses above given, while not affecting the healthy vessels, cause a serous exudation from the diseased capillaries, which exerts a favorable influence upon the surrounding tissues. From experiments thus far made, it is asserted that the drug causes a rapid cure of tuberculous ulcers in the larynx, subsidence of the local pulmonary symptoms, and an improvement in the general condition; but in several instances an unfavorable action upon the genito-urinary apparatus has been noticed. A further trial of the remedy is needed before positive statements can be made in regard to its therapeutical value.

Emplastrum Cantharidis.—*Externally* employed as a vesicant. When it is applied to one part for a short time only, and then removed to another, the process is known as applying flying blisters, and is recommended in acute articular rheumatism and other affections.

Unguentum Cantharidis.—*Externally* employed as a derivative and rubefacient in rheumatism and other pains, but will blister if kept too long in contact with the skin. The application of cantharidal ointment behind the ears is often efficacious in relieving toothache.

Oleum Cantharidis.—(Made by digesting 3 parts of cantharides in 10 parts of olive oil for ten hours over a water bath.)

Internally employed (rarely) in doses of gr. $\frac{1}{4}$ to $\frac{1}{2}$ two or three times a day in gelatin capsules or pills (made with vegetable extracts and powders) in the treatment of psoriasis and alopecia areata.

Externally in rubefaciant liniments.

Tinctura Cantharidis.—(One part cantharides to 20 alcohol.)

Internally employed (rarely) in doses of 4 to 10 drops three times a day in a mucilaginous mixture for atony of the bladder and impotence, but must be used carefully because of the danger of causing albuminuria.

Externally as a rubefacient.

Collodium cum Cantharide.—A very convenient and cleanly mode of producing vesication consists in painting the part, over the area desired, with cantharidal collodion.

℞ Tinct. cantharidis, ... ʒ i.
Ol. ricini, ... ʒ xij.
Ol. jasmini, ... ʒ i.
Ol. neroli, ... gtt. x.
M. S. Stimulating hair oil, for alopecia.

℞ Tinct. cantharidis, ... ♏ xlv.
Ol. olivæ, ... ʒ vi.
Spir. odorati, ... ʒ xij.
Ol. rosæ, ... gtt. iij.
M. S. Rub gently on the scalp by means of a sponge. (Alopecia.)

CARBO LIGNI.

Internally, wood charcoal is used in doses of gr. viij.–xxx. several times a day in powder, troches, or electuary to prevent fermentative changes in the stomach and intestine.

Externally in powder to ichorous ulcers, in tooth powders and mouth washes (3 to 5 parts in 100), and in ointments (10 parts to 25).

CARBONEI BISULPHIDUM.

Counter-irritant, diaphoretic. A colorless liquid, with sharp, disagreeable taste and smell.

Internally employed in doses of 1 to 6 drops (maximum, 40 drops per day), in milk, mucilage, sweetened water, or preferably in capsules, for rheumatism, gout, amenorrhœa, and paralysis. It is, however, unreliable and not to be recommended.

Externally, pure or mixed with equal parts of a fatty oil,

applied to disperse gouty swellings and enlarged glands. It is also employed as a local anæsthetic.

CARBONEI TRICHLORIDUM.

Stimulant and analeptic.

Internally employed in doses of gr. iss.–vi. (not more than ʒ ss. pro die), in powder triturated with sugar, or in alcoholic solution, in the asphyxia and collapse of cholera.

CARDUUS BENEDICTUS.

Blessed thistle may be given in powder or infusion, but the extract is more commonly used.

Extractum Cardui Benedicti.—*Internally* employed as a pure bitter in doses of gr. viij.–xxiv. several times a day, but enjoys a traditional reputation especially in the treatment of the dyspepsia of drunkards, and in bronchial catarrh and dropsy, when a bitter is indicated.

℞ Ext. cardui bened., ... ʒ i.
Aq. amygdal. amaræ, ... ʒ v.
M. S. Twenty to 40 drops several times a day. (Chronic catarrhs of the respiratory tract.)

℞ Ext. cardui benedicti, ... ʒ i.
Ext. hyoscyami, ... gr. vij.
Aq. fœniculi,
Syr. glycyrrhizæ, ... āā ℥ i.
Liq. ammon. anisati, ... ʒ i.
M. S. One to two teaspoonfuls every two hours. (Chronic bronchitis.)

CARLSBAD SALTS.

See Sodii Sulphas.

CARLSBAD WATER.

For a "cure" away from Carlsbad, the water of the Mühl or Schloss-Brunnen is usually taken (although the chemical constitution of all the Carlsbad springs is about the same, the waters differing in temperature only). From two to four glasses of the water, warmed to from 100° to 120° F., are taken in the morning, fasting, the patient walking about in the mean while. In conjunction with the use of the waters a strengthen-

ing flesh diet with a little wine is prescribed, but the patient should avoid indigestible and fatty food, leguminous vegetables, acid fruits or drinks, and beer.

CARO.

The proportionate composition of the different sorts of meat and their nutritive value is shown in the following table, taken from Munk and Uffelmann, "Die Ernährung des gesunden und kranken Menschen," Vienna, 1887.

	Albumin.	Fat.	Salts.	Extractives.
Lean beef,	18.0	2.0	1.4	1.7
Raw scraped beef, free from fat,	20.0	0.5	1.4	1.7
Scraped ham,	23.5	1.5	3.7	—
Veal,	15.5	1.0	1.25	1.25
Domestic poultry,	22.0	1.0	1.0	1.3
Wild fowl,	23.0	1.0	1.2	1.5
Ordinary meat broth,	0.4	0.6	1.2	1.2
Expressed meat juice,	60–70	0.5	1.2	1.5
Meat broth with the yolk of egg,	3.16	4.2	1.8	1.2
Beef tea,	0.5	0.5	1.6	1.33
Meat extract,	—	—	22.04	58.0

Beef Tea.—A watery extract of meat, prepared with heat, which contains, as far as such an extract can, the greatest amount of the nutritive substance of the meat; it is a pale blood-red gelatin, which does not keep long, but soon becomes putrid.

Liebig's Cold Extract of Meat.—To six ounces of fresh meat (or chicken), cut fine, add eight ounces of water with a little salt and a few drops of hydrochloric acid; let it stand for one hour, strain through a hair-sieve and steep the residue in 125 parts of water. This is a very nutritious extract, but must be used within a few hours after being made.

Peptonum Carnis.—Meat peptones are usually in the form of pasty extracts, seldom of dry powders, which are prepared by the artificial digestion of beef with pepsin or pancreatin (1 part ordinarily represents 3 parts of meat). In quantities of three to seven ounces a day, they offer, with the addition of carbohydrates, fat, salts, and extractives (Liebig's meat extract furnishes the latter), an excellent nutrient material in cases of digestive disorders, feverish conditions, and during

convalescence from acute diseases. Beef peptones may be given by the mouth or rectum, but for the latter mode of administration, since fluids are frequently rejected, peptone suppositories are best. These are made in the proportion of 24 grains of peptone to 150 grains of meat, and are to be inserted oiled, the rectum having been previously cleaned out with an enema of tepid water.

Pancreatin.—Dry pancreatin is prepared by extracting the pancreas with dextrin or sugar of milk in vacuo; fluid pancreatin by extracting the cut-up organ with glycerin.

Internally the dry pancreatin may be given in doses of gr. viij.–xv., the liquid in doses of a teaspoonful, in cases of weak digestion. More commonly, however, the preparation is given by enema mixed with finely chopped beef. Leube's pancreas-meat enemas are made of finely scraped and chopped pancreas (℥ xij.) and lean meat (℥ ivss.) stirred up to the consistence of a thick porridge with water (℥ iij.).

CARRAGEEN.

See Cetraria.

CASCARA SAGRADA.

The bark of Rhamnus Purshiana is a reliable and, as far as present experience goes, harmless purgative for use in habitual constipation.

Internally the crude drug may be employed in doses of gr. iv. in powder or capsules.

Extractum Cascaræ Sagradæ is stronger than the following. It may be given in doses of gr. i.–iss. in pills two or three times a day, but preferably in the evening, as its action is slow, the effects being produced only at the end of ten to twelve hours.

Extractum Cascaræ Sagradæ Fluidum.—This is the most usual form of administration of the drug. It is given in doses of 20 to 30 drops at night, or several times a day, in habitual constipation, dysentery, hemorrhoids, and fissure of the anus. It is more commonly, perhaps, given in mixture.

℞ Extr. cascaræ sagradæ fl.,
Syr. zingiberis,
Aq. destillatæ, ... āā ℥ i.
M. S. One to two teaspoonfuls at night, as required.

CASTANEA VESCA.

Chestnut is recommended in the treatment of catarrhal troubles, but especially whooping-cough. The dose of the fluid extract (extractum castaneæ fluidum) is one-half to one teaspoonful two or three times a day for children, and in correspondingly larger amounts for adults.

CASTOREUM.

Internally employed in doses of gr. viij.–xv. (of Siberian castor half the amount) in powder or pill in erethistic motor and sensory disturbances of hysterical persons, in cramps and neuralgias, and in cardialgia and vomiting.

Tinctura Castorei.—*Internally* given in doses of 20 to 30 drops several times a day; of the tincture of Siberian castor the dose is 10 to 30 drops.

Externally employed in infusion of chamomile (3:100) for blepharospasm; for ear-drops; given also by enema in doses of ♏ xv.–lx.

℞ Tinct. castorei, ... ʒ iiss.
Infus. valerianæ, ... ℥ iv.
Syr. anthemidis, ... ʒ vi.
M. S. A tablespoonful every two hours.

℞ Castorei, ... gr. viij.–xv.
Potass. bromid.,
Sacch. lactis, ... āā ʒ i.
M. et div. in chart. No. 10. Sig. One powder three times a day. (Antispasmodic powders.)

℞ Castorei, ... ʒ ij.
Ol. theobrom., ... ʒ x.
M. et ft. suppos. No. 4. S. An antispasmodic suppository.

℞ Tinct. castorei,
Tinct. valerianæ, ... āā ʒ ij.
M. S. Twenty to 30 drops three times a day. (Hysteria, cramps.)

CATECHU.

A dry extract of the wood of Acacia Catechu, employed where tannin is indicated. It is given in doses of gr. viij.–xxx. combined with opium (gr. $\frac{1}{6}$ to $\frac{1}{3}$), in powder or pill several

times a day, and also in solution made with hot water (3 to 5 parts in 100) with wine in chronic diarrhœa.

Tinctura Catechu.—Dose, 20 to 60 drops several times a day. It is also employed pure as a dentifrice.

CERII OXALAS.

Internally employed in doses of gr. i.–v. two or three times a day, in powder with sugar of milk, in various gastric affections, especially in cardialgia and vomiting of pregnancy; it is also given in seasickness.

CETACEUM.

Spermaceti is the purified solid portion of the contents of special cavities in the body of the sperm whale. It occurs in white, shining, unctuous masses, having a crystalline fracture.

Internally employed in doses of gr. xv.–xlv. in powder, emulsion (5:100), or mixed with cod-liver oil (50:200, liquefied with gentle heat—teaspoonful doses), in pulmonary phthisis and so-called scrofulous affections.

Externally used in the preparation of ointments.

CETRARIA.

Iceland moss (Cetraria islandica or Lichen islandicus) is a mucilaginous and starchy bitter, a nutrient stomachic. The bitter principle only is extracted in infusions, the other constituents in decoctions.

Internally employed in doses of ʒ iij.–v. a day in decoction or infusion, ʒ iiss.–ʒ v., or a heaping tablespoonful in two glasses of water as a tea; evaporated, as a gelatin; and also boiled with milk as an expectorant, nutrient, and stomachic, in bronchorrhœa, phthisis, and weak digestion.

If the nutrient or emollient, without the stomachic, properties are desired, a special preparation may be used from which the bitter principle has been abstracted, the mucilagious part being left.

Chondrus.—Irish moss (Chondrus crispus, Fucus crispus, carrageen) is employed as a food, although its nutritive value is very slight; also as an emollient in irritable states of the larynx and intestinal canal.

CHARTA NITRATA.

See Potassii Nitras.

CHARTA RESINOSA.

Paper spread with pitch, colophony, and turpentine, employed as a mild counter-irritant, especially in rheumatism.

CHINOLINUM.

Antiseptic and antipyretic. Obtained from the distillation of quinine or cinchonine with alkalies. An oily fluid, of disagreeable taste and odor, slightly irritant to the stomach, which lowers the bodily temperature, and is said to act like quinine in malaria, intermittent fever, neuralgia, etc. It is, however, employed almost solely externally as an antiseptic in mouth washes and gargles (one-tenth to two per cent with oil of peppermint), and for painting the pharynx in diphtheria (five-per-cent solution in alcohol and water.)

Chinolini Tartras.—*Internally* employed in doses of gr. viij.–xv. (one-third to one-half as much for children) several times a day in wafers or in solution (gr. xv. in ℥ v. of a mixture of equal parts of syrup of raspberry and water) as an antiseptic and antipyretic.

Externally used for the same purposes and in the same way as pure chinolin.

℞ Chinolini tartratis, ... gr. xv.
Aq. amygdal. amar., ... ♏ viij.
Syr. rubi idæi,
Aq. destillatæ, ... āā ℥ iiss.

M. S. A tablespoonful every three hours. (Lemon juice or cracked ice may be given to restrain vomiting.)

℞ Chinolini tartratis, ... gr. xxiv.
Aq. destillatæ, ... ℥ iv.
Alcoholis, ... ℥ v.
Ol. menth. pip., ... gtt. ij.

M. S. To be used as a mouth wash, diluted with five to eight parts of water.

CHLORAL.

Chloral hydrate occurs in the form of colorless crystals, soluble in water and alcohol, having a sharp acrid taste. Maximum dose, gr. xlv., or ʒ iss. pro die. It is a tolerably cer-

tain hypnotic and sedative (but not entirely free from danger) which acts chiefly as a depressant to the cerebral functions, and is therefore better adapted to cases in which the sleeplessness is due to excitability of the intellectual powers than when it is caused by pain, cough, or dyspnœa. Skin eruptions (erythema, urticaria, etc.) are not infrequently caused by it. The symptoms of acute poisoning from very large doses are irregular shallow respirations, weakened heart action, and lowered temperature; chronic poisoning, produced by the long-continued use of the drug in increasing doses (chloral habit) is manifested by catarrhal pharyngitis, nausea, indigestion, skin eruptions, and gradual loss of physical and psychic power. The treatment of acute chloral-poisoning (as also of chloroform-poisoning, *q. v.*) consists in artificial respiration and subcutaneous injections of strychnine (gr. $\frac{1}{30}$ to $\frac{1}{12}$). The contra-indications to the use of chloral are heart and lung affections, long-continued high fever, and ulceration of the intestine.

Internally employed: (1) In doses of gr. xv. (increased, if necessary, to the maximum dose of gr. xlv.) in solution in sleeplessness due to the cause above mentioned.

2. In somewhat larger or full doses in psychic derangements running all the way from nervous excitability up to delirium tremens, puerperal eclampsia, and acute mania (gr. xxx.–xlv. in one dose at the beginning of the attack); also in tetanus.

3. In various other conditions, such as nervous asthma, obstinate hiccough, seasickness (in order to give the organism time, during sleep, to accustom itself to the motion of the vessel), nocturnal pollutions (in small doses), and as an antidote to strychnine-poisoning (initial dose of gr. xxx.–xlv., repeated in smaller amounts).

4. During child-birth when the pains are very severe, after the bag of waters has ruptured, in doses of about 15 grains every fifteen to thirty minutes until four have been taken. The woman then sleeps quietly between the pains and finds them also much reduced in severity. In very impressionable women a few whiffs of chloroform may also be given at the beginning of each pain.

5. In trismus and tetanus neonatorum, and convulsions from teething or due to scarlatinal nephritis (nurslings bear doses of gr. $\frac{1}{2}$; children from three to four years old, gr. iv.;

from five to ten years, gr. vij.); in chorea, in doses of gr. vij. morning and night, or gr. xv. at night, for children of five to ten years, and double the amount for those over ten years old; in laryngismus stridulus; and as a palliative in whooping-cough so long as no secondary changes in the lungs have taken place (gr. v.–xv. a day, in divided doses every two hours, for children from one to ten years of age).

Externally, chloral hydrate in ten-per-cent solution exercises a restraining influence on fermentative changes (lactic-acid fermentation), and is mildly caustic when applied to mucous membranes and to wounds. In diphtheria, painting the parts with a fifty-per-cent solution, afterward reduced, has been recommended. For urticaria a wash is employed of: choral, gr. xlv.; cherry-laurel water, ℥ i.; distilled water, ℥ vi. Warts and corns may be painted with a solution of gr. xx. : ℥ i. of water. Chloral is also given by enema or suppository, in the same dose as for internal administration as a hypnotic; thus, about 30 grains in half a glassful of water, with the addition of six or eight drops of laudanum if desired. In toothache a small grain of it may be wrapped in a pledget of cotton and inserted into the cavity of the tooth.

Chloral should not be employed subcutaneously, on account of the danger of abscess.

℞ Chloralis,
Camphoræ, ... āā ʒ i.
Cocainæ hydrochlor., ... gr. xij.
M. S. Apply heat until the mixture boils, then soak pledgets of cotton in it and press into the cavity of the tooth. (Toothache from caries.)

℞ Chloralis, ... ʒ i.
Syr. aurant. cort., ... ʒ vi.
Aq. destillatæ, ... ʒ x.
M. S. A tablespoonful (15 grains of chloral) at night, and increased if necessary.

℞ Chloralis, ... ʒ iiss.
Morph. hydrochlor., ... gr. iss.
Syr. aurant. cort., ... ʒ xij.
Aq. destillatæ, ... ℥ iiiss.
M. S. A tablespoonful every hour or two as a nervous sedative in mental disorders, etc.

℞ Chloralis, ... ʒ iss.–iij.
Ceræ flavæ, ... ʒ iss.
Ol. theobromæ, ... ʒ iij.
M. et ft. suppos. No. 6

℞ Chloralis, ... gr. iss.–vij.
Mucilag. acaciæ, ... ʒ vij.
M. S. For enema. (Convulsions of children.)

CHLORALUM FORMAMIDATUM.

Chloralamide occurs in the form of colorless crystals, soluble in 9 parts of water, and freely in alcohol. Hypnotic (3 parts chloralamide equal in strength 2 parts of chloral hydrate).

Internally employed in doses of gr. xxx.–xlv. (maximum dose, ʒ i.) at night in powder, wafers, or dissolved in water or beer. In insomnia potatorum or in the wakefulness of neurasthenia it induces, in three-quarters to one hour, a deep sleep of several hours' duration without any unpleasant after-effects, such as the feeling of fatigue and depression experienced after the use of sulphonal. It has also been recommended in much smaller doses in nervous diseases, cardiac troubles, phthisis, anæmia, arthritis deformans, syphilis, and lead-poisoning; but more thorough experiments are needed to test its efficacy in these conditions.

CHLOROFORMUM.

Chloroform is taken into the blood through the lungs in the form of gas, and, after a brief primary stage of excitation, paralyzes first the centres for sensation and consciousness, much later the respiratory centres, and ordinarily last of all the cardiac. Only purified chloroform should be employed, as the chemically impure drug is more apt to produce asphyxia. When it is necessary to use a sample of chloroform the purity of which is suspected, it should be shaken up with four parts of water, and then the latter, when it has risen to the top, is drawn off (Nothnagel and Rossbach).

A subcutaneous injection of atropine and morphine (see formula) before the administration of the chloroform hastens the narcosis, makes it more profound, and renders the awakening much more pleasant.

Employment of chloroform by inhalation:

a. As an anæsthetic in surgical and obstetrical operations, and also during labor when the pains are very severe or the woman especially sensitive to them; in the latter case the inhalation shall not be carried to full narcosis, but repeated at the beginning of each pain.

b. In spasmodic asthma, tetanus, puerperal and infantile eclampsia, convulsions, strychnine-poisoning, delirium tremens angina pectoris, and dyspnœa in pneumonia (inhalation for several minutes of about 30 drops every hour or half-hour). In many cases (hernia, dislocations) it is employed merely to produce muscular relaxation; and it may also be given in scrofulous ophthalmia, when photophobia is present, to facilitate examination.

Special caution should be observed in administering chloroform to nursing infants and the aged, in cases of chronic alcoholism, marked anæmia acute or chronic, obesity, cardiac affections, aneurism, and diseases of the respiratory organs with diminished breathing capacity.

Internally employed in doses of 2 to 5 drops on sugar (maximum dose, ♏ vij.), or in mixture with glycerin or syrup (♏ viij.–xxx. in ♆ i.—dose a teaspoonful), in painful and spasmodic affections of the stomach, in neuralgia, lead colic, seasickness, vomiting of pregnancy and of phthisical patients; also strongly recommended in the cold stage of intermittent fever (as a palliative) and during the apyrexial period (as a remedy), and in cholera; it has recently been employed in the treatment of tape-worm (see formulæ).

Externally employed as a local anæsthetic, pure or mixed with equal parts of olive oil, hyoscyamus, vaselin, glycerin, lard, soap liniment, or alcohol, applied simply to the parts or on cotton; a pledget of cotton moistened with any of these mixtures may be inserted into the cavity of an aching tooth, into the external auditory canal in earache, etc. It is also employed (2:100 water) to arrest the bleeding after the extraction of a tooth.

The treatment of chloroform-poisoning consists in the subcutaneous injection of strychnine in dose of $\frac{1}{12}$ grain, inhalation of nitrite of amyl, artificial respiration the tongue being drawn forward, faradization of the phrenic nerve, insertion of a piece of ice into the rectum, and if necessary tracheotomy.

℞ Chloroformi, ... ♏ xxiv.
Tr. valerian. æther., ... ʒ iiss.
M. S. Ten to 20 drops every hour. (Hysterical neuralgias and convulsions.)

℞ Chloroformi,
Ext. aspidii, ... āā ʒ i.
Emul. ol. ricini, ... ℥ iij.
M. S. Half this quantity at a dose morning and evening, to cause the expulsion of a tape-worm.

℞ Morph. hydrochloratis, ... gr. iij.
(Atropinæ sulphatis, ... gr. ½)
Aq. destillatæ, ... ʒ v.
M. S. Fifteen to 20 drops by hypodermic injection twenty to twenty-five minutes before the induction of narcosis.

℞ Chloroformi, ... ♏ xl.
Syr. simpl., ... ℥ iij.
M. S. One teaspoonful very hour. Shake thoroughly before using. (In the sleeplessness of old age when opium is contra-indicated, and in asthmatic attacks.)

℞ Chloroformi, ... ♏ xviij.
Mucil. acaciæ, ... ʒ iiss.
Aq. destillatæ, ... ℥ iv.
M. S. Two tablespoonfuls at a dose. Shake the bottle thoroughly. (Seasickness.)

℞ Chloroformi, ... ʒ i.
Tr. aconiti, ... ʒ iij.
Sp. odorati, ... ʒ ij.
M. S. For external application.

℞ Chloroformi, ... ʒ v.
Ætheris, ... ʒ x.
M. S. A cloth moistened with the mixture to be applied over the sacrum. (Gives great relief in labor when the pains are felt with especial vehemence in this region.)

℞ Ext. opii,
Camphoræ, ... āā gr. viij.
Bals. peruvianæ, ... gtt. viij.
Mastiches, ... gr. xv.
Chloroformi, ... ʒ iiss.
M. S. To be applied on cotton to an aching tooth.

℞ Chloroformi,
Acidi acet., ... āā ʒij.
M. S. To be rubbed on the skin, or applied by means of compresses. (An excellent local anæsthetic.)

℞ Chloroformi, ... ʒiv.
Ol. cajuput., ... ʒij.
Camphoræ, ... ʒi.
Ol. caryophyll., ... gtt. iij.
M. S. To be applied on cotton to an aching tooth.

℞ Chloroformi, ... ♏ xv.
Vitell. ovi unius,
Aq. destillatæ, ... Oij.
M. et ft. emulsio. S. One-third of this quantity in enema. (Lead colic.)

CHONDRUS.

See Cetraria.

CHRYSAROBINUM.

Pulvis ararobæ, Goa powder, is the purified pith of the stems of Andira araroba. It is not identical with chrysophanic acid.

Internally employed as an emetic and cathartic in doses of gr. v. for very young children, gr. viij. for children of twelve years, and gr. xv. for adults. It should be taken on an empty stomach, in which case doses of gr. viij.–x. in alkaline solution or pills will usually suffice. Not to be recommended.

Externally in mixture with vinegar or lemon juice, in ointment (1 to 5 in 25 parts, with the addition of a few drops of vinegar), or in collodion or traumaticin (1:10) in herpes circinata or tonsurans, pityriasis versicolor, and especially psoriasis. It must be employed with care, as it is a local irritant and is liable to excite unpleasant symptoms in parts where the skin is tender and on mucous surfaces (conjunctivitis, etc.); it is better never to use it on the face or hairy scalp.

℞ Chrysarobini, ... gr. xv.–xxx.
Adipis, ... gr. xv.
Lanolin, ... ʒij.
M. et ft. unguentum. S. For external use in psoriasis.

℞ Chrysarobini, ... gr. xv.
Ol. cadini, ... ʒi.
Collodii, ... ʒss.

M. S. For external use in chronic eczema with much itching.

CINCHONA.

Antipyretic, antiperiodic, tonic, antiphlogistic, antiseptic, and stomachic. Up to the present time no satisfactory explanation has been given of the therapeutic action of cinchona bark, its preparations and alkaloids, especially quinine. The latter is absorbed by the mucous membranes and subcutaneous tissues, and excreted chiefly in the urine. Given in doses of more than 10 grains it is apt to produce ringing in the ears, deafness, vertigo, and nausea; large toxic doses of ʒi. and more are followed often by collapse in addition to disturbances of sight and hearing and mental hebetude. Small doses increase the rapidity of the pulse and raise the blood pressure, while large doses have the contrary effect. An idiosyncrasy exists in many persons in whom the use of quinine causes an eruption, resembling urticaria, erythema, purpura, or measles, or a high fever. The alkaloid is an active poison to the lower organisms (less injurious to mould fungi and schizomycetes than to the other forms). The long-continued employment of quinine is said to weaken the sexual appetite, and in persons of advancing age to destroy it entirely.

The indications for the use of cinchona, and more especially of quinine and its salts, are the following:

1. In malaria, quinine and its salts are a sovereign prophylactic and remedy. The regular use of the drug in malarious districts affords a certain degree of protection against the disease, but it must be taken in solution and in sufficient dose.

2. In chronic malarial poisoning and in the malarial cachexia, quinine employed for a long period in moderate or large doses (gr. xxx.–xlv. per diem) not only controls the pyrexial attacks and the periodical neuralgia, but also reduces the enlarged liver and spleen, and brings about a complete cure through improvement in the general nutrition; it also acts in a similar manner in leucocythæmia.

3. In intermittent fever (quotidian or tertian) the remedy is to be given in moderate doses (gr. viij.) two or three times

a day in the apyrexial interval, and in one large dose (gr. xv.–xxiv.) from five to eight hours before the time of the attack. It is of little or no use to give quinine during the fever. In severe forms of the disease large doses should be given at short intervals (up to gr. lxxv. in twelve hours).

4. In remittent fever, the remedy is to be employed in medium doses during the remission.

5. In masked periodical fevers, intermittent neuralgia, periodical headache or toothache, and other forms of recurring pain, the quinine should be administered as in intermittent fever. Irregular masked forms of fever, neuralgias, etc., call for the continued administration of quinine in doses of gr. xv.–xxiv. for weeks at a time.

6. As a general antipyretic, quinine is surpassed in efficiency by the modern synthetic remedies, such as antipyrine.

7. In septicæmia and pyæmia it should be given in large doses (gr. xv. or more), together with generous quantities of wine, as early as possible; it often acts very efficiently in these cases, but is also frequently surpassed by antipyrine.

8. In many nervous and neuralgic conditions, especially neuroses of sensation, even when they are not distinctly periodical, though probably of malarial origin, quinine is often of service

9. In whooping-cough the drug may be given in not too small doses (gr. iss.–xv. per day according to the age of the patient); here also local applications of quinine, in solution or powder or spray, are useful.

10. Less reliable, yet not to be denied, is the action of quinine as a stomachic tonic to increase the appetite and improve the digestion, as a tonic during convalescence from acute diseases, etc. For this purpose it is given in various forms of tinctures, wines, etc.

Cinchonæ Cortex.—According to the requirement of the U. S. P., cinchona bark must contain at least three per cent alkaloids (two per cent quinine). It is employed usually in the form of a decoction (10 to 20 parts in 150), but not often, as it taxes the digestive powers, being usually replaced by quinine.

Extractum Cinchonæ.—*Internally* employed in doses of gr. viij.–xxx. several times a day in pill or mixture. *Externally* in mouth washes, for local applications, etc.

Tinctura Cinchonæ.—Given in doses of a teaspoonful three times a day in wine, or pure, as a stomachic.

Tinctura Cinchonæ Composita.—Whytt's tincture of bark (elixir roborans) is composed of: cinchona, 6 parts; gentian and orange-peel, each 2 parts; cinnamon, 1 part; macerated in 50 parts of alcohol. Used as a stomachic in doses of 3 ss.–i.

Huxham's tincture (Tr. Cinchon. Comp., U. S. P.) is made with red cinchona bark, bitter-orange peel, and serpentaria, and is employed for the same purposes as the above, in doses of 3 i.–ij.

Quinina.—The pure alkaloid is seldom used, being replaced by the salts, whose action, when taken in solution with or followed by a few drops of hydrochloric acid, is more rapid.

Quininæ Bimuriatica Carbamas.—The double hydrochlorate of quinine and urea is a very soluble salt, and is therefore adapted for hypodermic use (gr. xv.–xxx. in 3 iiss. water).

Quininæ Bisulphas.—*Internally* employed for the same purposes and in the same doses as hydrochlorate of quinine, and on account of its ready solubility is adapted for hypodermic use and also for injection in gonorrhœa.

Quininæ Ferro-citras.—The citrate of iron and quinine (Ferri et Quininæ Citras, U. S. P.) is employed in cases of anæmia and chlorosis in which a tonic is indicated, in doses of gr. iss.–viij. several times a day in powder or pills.

Quininæ Hydrobromas contains about eighteen per cent bromine and seventy-five per cent quinine.

Internally employed in doses of gr. iss.–viij. several times a day, in powder, pill, or solution, in hysteria, neuralgia, and neuroses of the stomach. Also in hypodermic injection for the relief of obstinate hysterical vomiting and other gastric neuroses, and of periodical headaches, neuralgias, etc.

Quininæ Hydrochloras.—A favorite salt of quinine by reason of its ready solubility (in 3 parts of alcohol, and 34 parts of water).

Internally employed in intermittent fever in initial doses of gr. viij. two or three times a day in the apyretic interval, and in one large dose of gr. xv.–xxiv. in wafers for five to eight hours before the paroxysm. For malarial fevers in children, a dose of gr. iss. for each year of life may be given in milk with syrup of orange peel or saccharin. As a general antipyretic

in adults, it may be given in dose of gr. xv.–xlv., but with caution in case of the larger amount.

Quininæ Sulphas is employed like the preceding. The salt is soluble only in 800 parts of water, but may be dissolved readily by the addition of a few drops of dilute sulphuric acid.

Quininæ Tannas contains thirty per cent of quinine. Is but slightly soluble in water, but readily so in alcohol. Employed in doses of gr. iss.–viij. several times a day, in powder or pill, for diarrhœa; also recommended for whooping-cough.

Quininæ Valerianas.—Soluble in 100 parts of water. Employed like hydrochlorate of quinine in the treatment of neuroses.

Quinidina.—Various salts (hydrochlorate, sulphate, tannate) of this alkaloid may be employed in the same way and for the same purposes as the corresponding quinine salts.

Chinoidinum.—A resinous preparation obtained as a by-product in the manufacture of quinine, composed of a mixture of amorphous alkaloids. It is undoubtedly efficacious, and very cheap, and may on this account be used in dispensary and private practice among the poor. Its action is similar to that of quinine, but it must be given in two or three times the dose in pills, powders, or in alcoholic or aqueous solutions (in the latter case a little acid must be added to facilitate its solution).

Cinchonina.—The sulphate of cinchonine is less reliable in its action than the corresponding quinine salt, and must be given in doses half as large again. It is, however, often used for the same purposes in powder or pill.

Vinum Cinchonæ.—Made by adding 100 parts each of tincture of cinchona and glycerin to 300 parts of sherry wine.

A more speedy effect is obtained by giving quinine in solution, or in powder followed by a few drops of hydrochloric acid.

A solution for subcutaneous use is made with hydrochlorate of quinine, 1 part in 5 parts each of water and glycerin; if the solution be warmed before use, no reaction will be excited.

Inhalations of a solution of gr. xxiv. quinine hydrochlorate in ℥ x. boiling water are employed in pneumonia with delayed resolution.

℞ Cinchonæ succirub., ... ʒ vi.
Aurantii cort.,
Cinnamomi,
Calami, ... āā ʒ i.
M. et ft. pulvis. S. One teaspoonful stirred in Hungarian wine three times a day. (In convalescence from acute diseases.)

℞ Cinchonæ, ... ʒ iiss.
Coq. cum
Aq. comm., ... q.s.,
ad colat. ℥ v., et adde
Vini rubri gallici, ... ℥ iss.
Syr. cinnamomi, ... ℥ i.
M. S. A tablespoonful every two hours.

℞ Cinchonæ, ... ℥ iij.
Valerianæ, ... ℥ iss.
Alcohol, ... ℥ vi.
Vini albi, ... Oij.
Macera p. dies 8. Filtra. S. Cinchona wine; one wineglassful a day.

℞ Decocti cinchonæ (cinchon., ʒ iiss.), . . ℥ v.
Liq. potassii citratis,
Syr. aurantii cort., ... āā ℥ ss.
M. S. A tablespoonful every three hours. (Pleuritis.)

℞ Quininæ sulphatis, ... gr. xv.
Acidi sulphurici, ... q.s.
Aq. destillatæ, ... ℥ v.
Syr. aurantii cort., ... ℥ i.
M. S. A tablespoonful every two hours.

℞ Quin. hydrochloratis,
Ferri reducti, ... āā ʒ ss.
Ext. gentianæ, ... q. s.
M. et ft. pil. No. 30. S. Two pills three times a day. (In convalescence from debilitating diseases.)

℞ Quin. hydrobromatis, ... gr. xv.
Ætheris, ... ʒ ij.
Alcohol, ... ʒ ss.
M. S. To be taken at one dose before the attack. (Pernicious fever.)

℞ Quininæ hydrochloratis, . . . gr. iss.–iiss.
Sodii bicarb., ... gr. iiss
Pulv. acaciæ, ... ʒ ss.

M. et div. in chart. No. 10. S. One powder insufflated into the larynx twice a day. (Microbicide.) (A specific for whooping-cough.)

℞ Extr. cinchonæ, ... gr. xlv.
Medullæ bovis, ... ℥ vi.
Ol. jasmini, ... ʒ i.
Succi limonis,
Tinct. cantharidis, . . . āā ♏ xxiv.

M. et. ft. unguentum. S. Pomade for the hair.

CINNAMOMUM.

The inner bark of the shoots of the Cinnamomum zeylanicum (Ceylon cinnamon) or of the Cinnamomum Cassia (Chinese cinnamon).

An *aromatic stomachic*, acting also upon the uterus like, though much less powerfully than, ergot (and probably also on the smooth muscular tissue in general), and as a styptic and astringent. It is employed, therefore, as an adjuvant to remedies for diarrhœa and in the second, non-febrile stage of acute intestinal catarrh, and in torpidity and slight hemorrhage of the uterus, usually in combination with ergot.

Internally given in doses of gr. v.–xx. several times a day in powder, pill, electuary, infusion, and maceration (ʒ i.–ʒ ss. in ℥ v. of wine, water, or milk).

Externally as an ingredient of tooth-powders, catarrh snuffs, and enemata.

Aqua Cinnamomi.—Employed ordinarily merely as a vehicle, especially for solutions of quinine.

Oleum Cinnamomi.—Used to make oil-sugars, alcoholic solutions, and the water.

Syrupus Cinnamomi.—Employed as an adjuvant.

Tinctura Cinnamomi.—Given in doses of ʒ i.–ij. several times a day.

Tinctura Aromatica.—Composed of cinnamon, 5 parts; ginger, 2; galanga, cloves, and cardamom, each 1 part; in alcohol, 50 parts. Dose, 20 to 60 drops several times a day.

Pulvis Aromaticus.—Composed of cinnamon, cardamom,

and ginger. Given in doses of gr. v.–xv. several times a day, alone or as a corrigens.

Aqua Aromatica.—A water distilled from cinnamon and various other aromatics.

COCAINÆ HYDROCHLORAS.

Cocaine, the alkaloid obtained from the leaves of Erythroxylon Coca (*q. v.*), occurs in the form of translucent cystals, colorless and odorless, but having a bitter taste, soluble in alcohol and water; it is present in the leaves in the proportion of about two per cent. The use of cocaine in doses of less than 1 grain promotes a feeling of general well-being, similar to that caused by chewing coca leaves, and when applied locally to the mucous membranes produces local anæsthesia and anæmia, and in the eye dilatation of the pupil. Not infrequently in specially sensitive people, single doses of 1 grain and even less, especially when given hypodermically, give rise to alarming general symptoms, such as pallor, coolness of the surface, a feeling of weakness, gastric disturbance, irregular pulse, and a condition resembling alcoholic intoxication; sometimes also dyspnœa, stupor, or convulsions. Excessive doses or a too long-continued use of the drug may cause a mental and physical deterioration resembling idiocy. This is especially often seen in the case of victims of the morphine habit, who not infrequently are led to substitute cocaine for the morphine. The use of cocaine, and also the deprivation of it in one who has acquired the habit, may cause hallucinations of various sorts. For this reason great care should be taken that the amount of cocaine applied at one time to an absorbent surface should not exceed 1 grain. In acute poisoning the patient should be placed in a horizontal position, and be caused to inhale nitrite of amyl. In chronic poisoning the treatment should consist in the gradual withdrawal of the drug. In the case of a person addicted to morphine, cocaine should never be given in doses of more than 1 grain a day, its use should never be continued for more than six days in succession, and it should never be given hypodermically.

Internally employed in doses of gr. $\frac{1}{6}$ to i. (never more) in solution three times a day in gastralgia, obstinate vomiting, especially of pregnancy, seasickness, stenocardia, not depend-

ent upon actual lesions of the heart, whooping-cough, asthma, the lancinating pains of locomotor ataxia, distressing symptoms caused by deprivation of the drug in morphinomaniacs, depressed conditions, etc. In dyspepsia, gastric and intestinal catarrh, or the diarrhœa of children the effects of cocaine are not so marked.

Externally the action of cocaine as a local anæsthetic when applied to mucous membranes and other absorbent surfaces overshadows all others. It is employed (1) in ten to twenty per cent aqueous solutions prior to small superficial operations, but here it is frequently administered hypodermically *in loco*, as its action when applied to the skin, especially when inflammation is present, is practically nil.

2. In laryngeal examinations and operations, in minor operations upon the ear, the gums, tongue, tonsils, and nasal cavities, as well as the urethra, vagina, and rectum (5 drops of a twenty-per-cent solution contain, of course, 1 grain of the drug.)

3. For use in the eye a two-per-cent solution is of the proper strength; a few drops are introduced into the eye, and this is spread about over the conjunctiva and diluted by rapid winking, thus rapidly overcoming the smarting which the first introduction is liable to excite.

4. For the relief of already existing pains and irritable conditions of the most varied sort, such as toothache (painting the gum with a solution, putting a minute particle in the cavity of the tooth; for the painless extraction of a tooth an injection is made into the gum—see formula), ulcerated tooth, stomatitis, tonsillitis, laryngitis, laryngismus stridulus, whooping-cough, earache, tenesmus, vaginismus, and neuralgias of various kinds, especially of the trigeminus (see formula), in which case the drug is also employed subcutaneously in doses of 20 to 30 drops of a two-per-cent solution. In many of the above-mentioned conditions the effects of cocaine are very transitory and often uncertain.

5. For the relief of the distressing itching and burning associated with many affections of the skin, of insect bites, and of erysipelas of the face and scalp.

6. Urethral injections of a two-per-cent solution before the passage of urine, when scalding is present, and before the use of irritant injections.

7. As an ingredient of pain-producing substances to be employed in subcutaneous or submucous injection, in doses of not to exceed gr. ½.

Cocaine may advantageously be employed by subcutaneous injection (in one to ten per cent solutions, which readily spoil, and may, therefore, be made with the addition of a minute quantity of sublimate) as a local anæsthetic in the majority of the above-named conditions. It must, however, be used with extreme caution, by reason of the not uncommon individual idiosyncrasy of many persons, in consequence of which very alarming symptoms may arise from the exhibition of moderate doses; and furthermore the danger of establishing a cocaine habit must always be borne in mind.

℞ Cocainæ hydrochlor., ... gr. iss.
Aq. amygdal. amaræ, ... ʒ iiss.
M. S. Ten to 15 drops several times a day, for gastralgia, vomiting, and pertussis.

℞ Cocain. hydrochlor., ... gr. iij.
Aq. destillatæ, ... ʒ iiss.
M. S. For instillation into the eye and injection into the urethra.

℞ Cocain. hydrochlor., ... gr. v.
Aq. rosæ, ... ʒ iv.
M. S. for application to the skin in erysipelas, or neuralgia.

℞ Cocain. hydrochlor., ... gr. iij.–iv.
Ol. theobromæ, ... ʒ ij.
M. et ft. suppos. No. 4. S. For employment in tenesmus.

℞ Cocainæ hydrochloratis, ... gr. vi.
Liq. hydrarg. chlorid. corrosiv. (1 : 10,000), ʒ iiss.
M. S. ♏v.–xv. by hypodermic injection. (For local anæsthesia. Cautiously in the treatment of the morphine habit.)

℞ Cocain. hydrochlor.,
Chloralis, ... āā gr. ss.
Aq. destillat., ... ʒ xij.
M. S. Two to 3 drops injected into the gum prior to the extraction of a tooth.

CODEINA.

See Opium.

COFFEA.

Internally in decoction of the roasted and ground berry as a stimulant, for the stupor of acute alcoholism and narcotic poisoning, as an antidote in poisoning with various alkaloids, and as a domestic remedy for headache.

Externally as an antiseptic dressing to wounds. Mixed in equal parts with iodoform it masks the disagreeable odor of this substance.

℞ Antipyrin., ... ʒ iiss.
Sodii bicarb., ... gr. xv.
Saccharini, ... gr. iij.
Infus. coffeæ, ... ℥ v.

M. S. Two or 3 tablespoonfuls a day. (Syrupus Diabeticus.)

See also Caffeina.

COLA-NUT.

The seed of Sterculia acuminata, containing about two per cent caffeine and 0.5% theobromine.

Internally employed as a nervine in infusion (℥ iss.–iij. in ℥ iij.–x. of water).

Extractum Colæ Fluidum.—Given in doses of ♏ iss.–iij. several times a day.

COLCHICUM.

An acrid narcotic, acting powerfully upon the stomach and intestinal canal and paralyzing the central nervous system. Death occurs through paralysis of respiration, or, according to some, of the heart.

Internally the powder of the seeds is employed (rarely) in doses of gr. i.–iij. Its action in acute and chronic gout, as also in rheumatic affections of all kinds, is unreliable.

Tinctura Colchici and Vinum Colchici Seminis.—Made from 15 parts of the powder of colchicum seeds in 100 parts of alcohol or sherry wine. (The Vinum Colchici Radicis is made from 40 parts of the powdered root to 100 of sherry wine; dose, ♏ v.–xx.)

Internally employed in doses of ♏ x.–xl. (maximum dose,

3 ij. a day), sometimes with a few drops of laudanum, in gout and rheumatism.

Acetum Colchici.—*Internally* employed in doses of ♏ xv.–3 i. several times a day in saturation with carbonate of ammonium or potassium.

Colchicina.—*Internally* employed in doses of gr. $\frac{1}{64}$ to $\frac{1}{32}$ in solution or pill, from one to three times a day for gout and rheumatism, but with care; it may also be given in hypodermic injection.

℞ Tinct. colchici, ... 3 ij.
Tinct. opii camph., ... 3 ss.
M. S. Fifteen drops every four hours. (In acute rheumatism.)

℞ Colchicinæ, ... gr. ss.
Alcoholis, ... 3 ss.
Aq. destillatæ, ... 3 iss.
M. S. Five to 10 drops in a tablespoonful of water two or three times a day. (To be stopped if it acts too freely on the bowels.)

℞ Tinct. colchici,
Tinct. guaiaci, ... āā 3 iij.
Tinct. opii, ... 3 i.
M. S. Thirty to 40 drops three times a day. (In chronic rheumatism.)

℞ Colchicinæ, ... gr. i.
Pulv. althææ,
Mucil. acaciæ, ... āā q. s.
M. et ft. pil. No. 30. S. One pill three times a day. (In acute articular rheumatism.)

COLD-CREAM.

See Unguentum Aquæ Rosæ.

COLLODIUM.

A solution of gun-cotton (pyroxylin), 4 parts, in alcohol, 26 parts, and stronger ether, 70 parts.

Externally employed as a protective dressing, to make compression and to hold the edges of a wound in apposition, and combined with iodine as an application to enlarged

glands, orchitis, etc. Collodion may most easily be removed from the skin by washing with ether.

Collodium cum Cantharide.—See Cantharis.

Collodium Flexile.—Made with castor oil, 3 parts, Canada turpentine, 5 parts, and collodion, 92 parts. A softer and more flexible protective for burns, slight inflammations and frost-bites. A five-per-cent solution of salicylic acid (or one-tenth-per-cent solution of sublimate) in flexible collodion is useful in insect bites.

Collodium Corrosivum.—Composed of ½ to 1 part of corrosive sublimate, 4 parts of ether, and 20 parts of collodion. It is employed to remove pigmented spots, mother's marks, etc.

℞ Collodii flexilis, ... ℥ i.
Terebinth., ... ♏ xxiv.
Ol. ricini, ... ♏ viij.

M. S. For painting the parts in erysipelas, zoster, burns, frost-bites, rheumatism, etc.

℞ Collodii, ... ʒ vi.
Liq. plumbi subacet., ... ♏ xv.

M. S. To be painted over the parts when bed-sores threaten.

℞ Collodii, ... ʒ v.
Ferri sesquichlor., ... āā ʒ i.

M. S. A styptic collodion. (Not the collodium stypticum of the U. S. P., which is made with tannin.)

℞ Collodii, ... ℥ ss.
Morph. hydrochlor., ... gr. viij.

M. S. Collodium morphinatum. (For external application in neuralgia.)

COLOCYNTHIS.

A *drastic cathartic*, similar in its action to aloes but much more drastic. It is a favorite remedy, in doses of gr. ij.–viij., in powder, pill, or decoction, in dropsical conditions to produce watery stools, in cases in which other resorbents are contra-indicated.

Extractum Colocynthidis.—*Internally* employed in doses of gr. ⅙–i., as an intestinal irritant, and gr. i.–v., as a purgative.

Tinctura Colocynthidis.—*Internally* employed in doses of 5 to 20 drops (maximum, ʒ i. pro die), in a mucilaginous vehicle, and as an ingredient of diuretic and drastic mixtures.

℞ Tinct. colocynth., ... ♏ viij.–xv.
Sacch. albi, ... gr. lxxv.
M. et div. in chart. No. 10. S. One powder every two hours. (Obstipation and dropsy.)

℞ Ext. colocynth., ... gr. xv.
Saponis, ... ʒ ss.
Ol. anthemidis infusi, ... ♏ viij.
M. et ft. pil. No. 30. S. One to five pills at a dose. (Obstipation.)

℞ Ext. colocynth., ... gr. xv.
Ext. aloes, ... ʒ ss.
Ext. hyoscyami, ... gr. viij.
M. et ft. pil. No. 30. S. One pill at night, for habitual constipation. (The hyoscyamus is added to prevent griping.)

℞ Tinct. colocynth.,
Tinct. scillæ, ... āā ʒ ss.
Tinct. guaiaci, ... ʒ iij.
M. S. Twenty drops three or four times a day. (Diuretic.)

COLUMBA.

A mucilaginous bitter which does not affect the stomach, but is constipating.

Internally employed in doses of gr. viij.–xxx. several times a day in powder, but more commonly in infusion or decoction (℥ ss.–℥ v.) as a simple bitter in weak digestion; and also in chronic diarrhœa with dyspeptic symptoms, in chronic dysentery, and in intestinal tuberculosis.

℞ Decoct. columbæ, ... ℥ v.
Tr. opii, ... ♏ xv.–xxx.
Syr. amygdalæ, ... ʒ v.
M. S. A tablespoonful every two hours, in the diarrhœa of phthisis.

℞ Infusi columbæ, ... ℥ v.
Post refriger. adde
Elixir. aurant. comp., ... ʒ iss.
Syr. simplicis, ... ʒ v.
M. S. One tablespoonful every two hours. (Contains the bitter principle of colombo, but not the mucilaginous portion. The latter is contained in the decoction.)

CONDURANGO.

A *stomachic.* Condurango bark has not maintained the reputation it once enjoyed as a specific for carcinoma of the stomach, yet it is (especially when prepared by maceration) a good stomachic, which improves the appetite and digestion even when cancer of the stomach is present.

Extractum Condurango Fluidum.—*Internally* employed in doses of 10 to 30 drops several times a day.

Extractum Condurango Alcoholicum.—Dose, gr. iss. in pill five to ten times a day. (1 part of the extract is the equivalent of 7 of the crude drug.)

Vinum Condurango.—Prepared by macerating 1 part of condurango in 10 parts of sherry wine for eight days, and then expressing. Dose, one tablespoonful several times a day.

Take of:

Condurango bark, ... ʒ v.

Macerate in

Cold water, ... ℥ viij.

for twelve hours and then boil to ℥ v.

Strain and add

Hydrochloric acid, ... ♏ xxiv.

Syrup of orange-peel, ... ℥ ss.

Dose. One tablespoonful three times a day. (Stomachic for chronic gastric catarrh and loss of appetite.)

℞ Ext. condurango fl., ... ʒ ss.

Chloralis, ... gr. viij.–xxx.

Syr. aurant. cort., ... ʒ v.

Aq. destillatæ, ... ℥ vi.

M. S. A tablespoonful every two or three hours. (In gastralgia with poor digestion.)

℞ Ext. condurango alcoholici,

Pulv. condurango, ... ää ʒ iss.

M. et ft. pil. No. 80. S. One pill three times a day.

CONIUM.

Paralyzes the motor nerves and later the motor centres, and when locally applied to the sensory nerve-endings quiets pain and irritability; long-continued use weakens the sexual powers. Care must be exercised in its use.

Internally employed in doses of gr. i.–v. (maximum dose, gr. viij., or ʒ i. pro die) several times a day in powder, pill, or infusion (one to two per cent) in diseases of the spinal cord with increased reflexes, in neuralgia, pains in the eyes, ears, face, and elsewhere, and as a specific in mastitis (?). It should not be used for neuralgia when anæmia exists.

Externally applied in neuralgia, painful swellings, etc., in infusion or decoction (one to four per cent), ointment (1 part of the extract to 5 to 10 of the excipient) as an eye-salve in scrofulous ophthalmia and blepharospasm, in poultices, or by enema.

Extractum Conii.—Dose, gr. ss.–i. For external use to relieve local pains a plaster of conium may be made.

Coniina.—The alkaloid of conium has been recommended as a substitute for curare, but it should be employed tentatively with the greatest care, and preferably not at all.

Internally given in dose of gr. $\frac{1}{300}$ to $\frac{1}{60}$ in pills, drops, or mixtures in rheumatic and traumatic tetanus. (The chief danger consists in causing paralysis of respiration.)

Coniinæ Hydrobromas.—*Internally* and subcutaneously employed in doses of gr. $\frac{1}{24}$ to $\frac{1}{6}$ for the same purpose as the preceding.

CONVALLARIA MAJALIS.

Lily of the valley is employed like digitalis—for which, however, it is not in all respects a substitute—in diseases of the heart and kidneys accompanied with dropsy; and also in nervous palpitation of the heart and in epilepsy. (Caution must be used, as the drug has the reputation of markedly influencing the heart's action.)

Internally employed in infusion of the flowers (5 parts to 100 water) in doses of a tablespoonful two or three times a day.

Extractum Convallariæ.—Given in doses of gr. iss.–viij. in powder, or in alcoholic solution (1:4), 25 drops four times a day.

Tinctura Convallariæ.—Employed in doses of 10 drops four times a day.

Convallamarinum.—*Internally* employed in doses of gr. $\frac{1}{12}$ to i. (5 grains a day) to meet the same indications as convallaria, but its use is not advisable.

COPAIBA.

A remedy which tends to check the secretions, but exerting a diuretic action as a result of local irritation of the kidneys; its long-continued administration causes indigestion and sometimes produces a rash resembling urticaria.

Internally employed in doses of 10 to 40 drops, pure or flavored with a few drops of lemon juice or peppermint water, and also in emulsion and pill form. The best mode of administration is in capsules, each containing gtt. viij. of the balsam, either pure or with equal parts of extract of cubeb, and sometimes also with sulphate of iron or iron powder; dose, six to twelve capsules a day. It is best to begin with large doses and then, when improvement follows after several days, to continue the remedy for a week or two in smaller doses.

1. In gonorrhœa after the disappearance of the acute inflammatory symptoms, and less efficacious, though still useful, in chronic catarrh of the bladder, and bronchorrhœa (?). It is also given by injection into the urethral canal in emulsion (5 to 10 parts in 100).

2. For bronchial and pulmonary hemorrhage, in the form of Chopart's mixture (see the formula).

℞ Ceræ albæ, ... gr. lxxv.
terendo admisce
Copaibæ, ... ʒ iiss.
Pulv. cubebæ, ... ℥ ss.
M. et ft. pil. No. 150. S. Six to ten pills, at first twice, then three times a day. (About three boxes in all are required.)

℞ Copaibæ, ... ℥ ss.
Gum. acaciæ, ... ʒ ij.
Aq. menth. pip., ... ℥ iv.
Syr. cinnamomi, ... ʒ v.
M. S. One tablespoonful every two hours.

℞ Copaibæ,
Syr. bals. tolut.,
Alcohol, ... ãã ℥ i.
Spt. æther. nitrosi, ... ʒ i.
M. S. One tablespoonful two or three times a day, in hæmoptysis, in which it does service sometimes even in seemingly desperate cases. (Chopart's mixture modified by Wolff.)

℞ Copaibæ,
Tinct. aromaticæ, ... āā ℥ ss.
M. S. Twenty to 40 drops three times a day. (Aromatic tincture contains cinnamon, cloves, cardamom, ginger, and galanga.)

℞ Copaibæ, ... 3 x.
Sodii carbonat., ... 3 v.
(Tr. opii, ... 3 i.)
Aq. destill., ... q.s. ad Oij.
M. S. For injection, mixed with three parts of water, in gonorrhœa.

COTO.

Internally employed in doses of gr. v.–viij. several times a day or in decoction in the treatment of diarrhœa of phthisical patients, of the insane, and of children, and in chronic intestinal catarrh, not as an astringent, but as a remedy promoting absorption. It is, however, seldom employed in either of the above forms, as it irritates the stomach.

Tinctura Coto.—Given in doses of 20 to 50 drops in water or red wine several times a day.

Cotoinum.—A glucoside made from coto, employed internally is doses of gr. ⅓ to iss. several times a day as a powder in wafers or capsules, or diffused in water.

Paracotoinum.—Paracotoin is somewhat weaker than the preceding, and is given in doses of gr. iss.–iij. in powder, rubbed up with gr. viij. of sugar, every two hours in cases of simple catarrh of the stomach and diarrhœa.

CREASOTUM.

A clear, slightly yellowish, oleaginous fluid, of a burning taste, almost insoluble in water, but making a clear mixture with alcohol, obtained by distillation from beech-wood tar. It is a mixture of various substances, chiefly creosol and guaiacol, and in general resembles carbolic acid, being like it antiseptic.

Internally employed in doses of ♏ ⅙ up to the maximum of ♏ iij. (♏ xv. per day), in gelatin capsules, pills, or oleaginous or alcoholic solution, in abnormal fermentative processes in the stomach or intestine, in carcinoma of the stomach (then often

combined with balsam of tolu, *q. v.*); and is especially recommended in pulmonary tuberculosis, in which affection it can be given for months at a time in large doses, beginning, however, with small ones of ♏ iiss. a day and increasing gradually every four or five days up to ♏ xv. or even ♏ xxx. a day, and combined if need be with the tuberculin or cantharidin treatment.

Externally used for the same purposes as carbolic acid. Also given by enema in doses of ♏ iss.–iv.

Aqua Creasoti.—A one-per-cent solution.

Internally employed (rarely) in doses of a teaspoonful in bronchitis, pulmonary gangrene, diabetes, gastric fermentation, diarrhœa, etc.

Externally used as an injection in unhealthy fistulæ, in empyema after thoracentesis, in disinfectant dressings, etc.

Guaiacolum.—A colorless, highly inflammable liquid. It is the most active ingredient of creasote, of a less disagreeable odor than this substance, readily soluble in alcohol, but with difficulty in water.

Internally given in doses of ♏ ss.–iss. each up to ♏ viij.–xv. per day, in gelatin capsules, pills, or alcoholic solution, in pulmonary tuberculosis (see also Iodoform).

℞ Creasoti, ... ♏ ½
Alcoholis, ... ♏ iv.
Mucil. salep., ... ℥ iv.
M. S. One-half to one teaspoonful every two hours. (Cholera infantum.)

℞ Creasoti (or guaiacoli), ... ♏ xv.
Tinct. gentianæ, ... ♏ xl.
Spir. vini rectif., ... ʒ vi.
Vini albi, ... ℥ iij.
M. S. A teaspoonful three times a day in a wineglass of water.

℞ Guaiacoli, ... ♏ xv.–xxx.
Alcohol, ... ʒ v.
Aq. destillat., ... ℥ vi.
M. Keep in a colored bottle. S. A teaspoonful to a tablespoonful two or three times a day in a glass of water after meals.

℞ Creasoti, ... ♏iss.–iij.
Aq. menth. pip., ... ℥ vi.
Mucil. salep., ... ℥ i.

M. S. A tablespoonful every two hours. (Vomiting of pregnancy.)

℞ Creasoti, ... ♏xv.
Pulv. althææ,
Ext. glycyrrh., ... āā gr. xxij.

M. et ft. pil. No. 30 (gelatin coated). S. One or two pills three times a day. (Phthisis, cancer of the stomach.)

℞ Creasoti, ... ♏xv.
Plumb. acetat.,
Opii pulv., ... āā gr. v.
Ext. glycyrrh., ... ℥ iss.

M. et ft. pil. No. 50. S. Two pills three times a day. (Phthisis.)

CREOLINUM.

A blackish-brown, syrupy fluid, of an unpleasant tarry odor, prepared from coal, which is reputed not only to keep fresh wounds aseptic, but also to deodorize and render aseptic suppurating and ichorous wounds and to promote healthy granulation and cicatrization. It is also said to arrest parenchymatous hemorrhage, and not to produce any eczematous eruption of the skin. But as the composition of the different preparations in the market is not yet exactly known, and as one case of fatal, and another of transitory, poisoning (production of a scarlatiniform eruption, albuminuria, and dark-colored urine) are known to have taken place, it is well to observe caution in the use of the drug.

Internally it has been employed in doses of gr. v.–xv. in gelatin capsules in cases of very marked fermentative changes in the stomach, and of intestinal parasites; also in tuberculosis, but without any good results.

Externally in a mixture (having a milky appearance) with water (½ to 1 part in 100) as a lotion and dressing to fresh wounds, for the disinfection of septic wounds in a two to four per cent mixture, and for washing out the bladder in cystitis (½-per-cent mixture). It is also recommended for the disinfection of privy vaults.

CROTON-CHLORAL HYDRAS.

See Butyl-Chloral Hydras.

CROTONIS OLEUM.

See Oleum Tiglii.

CUBEBA.

Internally cubeb is employed in doses of gr. xv.–℥ iiss. several times a day as a powder in wafers, capsules, pills, or electuary, often combined with copaiba (q. v.) in the treatment of gonorrhœa after the subsidence of the inflammatory symptoms; it is best given only in chronic gonorrhœa, when injections fail to effect a cure, and only where the digestion is unimpaired.

Extractum Cubebæ.—Given for the same purpose as the above in doses of gr. v.–xv. in pills or capsules four or five times a day.

℞ Ext. cubebæ,
Copaibæ,
Ceræ alb. ras., ... āā ℥ i.
Pulv. cubebæ, ... ℥ iij.

M. et ft. pil. No. 100. S. Five pills every three hours. (In gonorrhœa and gleet.)

℞ Extracti cubebæ, ... ℥ i.
Pulv. acaciæ, ... ℥ ss.
Aquæ destill., ... ℥ i.
Magnesii carb., ... ℥ iss.

M. et ft. pil. No. 100. S. Ten pills three times a day. (In gonorrhœa, and especially in gleet.)

CUCURBITA MAXIMA.

See Pepo.

CUPRI SULPHAS.

Internally employed in doses of gr. i.–v. (maximum dose, gr. xv.) as an emetic for adults (for children gr. i.–ij.) in powder or solution, every fifteen minutes until vomiting is produced, in croup, diphtheria, poisoning with phosphorus and narcotics; in the latter case it is given first for its emetic effect, and afterward is continued in smaller doses.

Externally used as a collyrium (gr. iss.–3 v. distilled water), or in substance (blue stone) for touching the conjunctivæ in cases of sluggish chronic inflammation, and in trachoma (applied daily or every other day).

℞ Cupri sulphat., ... 3 ss.
Sacch. albi, ... 3 ij.

M. et div. in chart. No. 10. S. One powder every ten minutes until vomiting is produced. (To empty the stomach in cases of poisoning.)

℞ Cupri sulphatis, ... gr. viij.
Syr. simplicis, ... 3 vi.
Aq. destillatæ, ... 3 xij.

M. S. A teaspoonful every ten minutes until vomiting occurs, and then every half to one hour. (In croup.)

CUPRI SULPHAS AMMONIATUS.

An *antispasmodic* nauseant. It is given in doses of gr. $\frac{1}{6}$–$1\frac{1}{2}$ (gr. vi. pro die) in powder, pill, or solution in water or simple syrup (easily decomposed) for epilepsy, chorea, and spasmodic affections in general, and in trigeminal neuralgia occurring in elderly persons with good digestion.

CUPRI SULPHOCARBOLAS.

Recommended to meet the same indications as Zinci Sulphocarbolas (which see).

CUPRUM ALUMINATUM.

Aluminated copper (lapis divinus), made from sulphate of copper, alum, and camphor, is an efficient mild astringent, in not too inveterate catarrhs of the mucous membranes, especially of the conjunctiva, employed in the form of pencils, as an eye-powder (1 part to 2 to 5 of sugar), or collyrium (gr. i.–viij. in ℥ i. rose water).

CURARE.

Curare or woorari (South American arrow poison) is derived from several varieties of Strychnos, Cocculus, and Paullinia; it is an antitetanic, paralyzing first the motor nerve-

endings in the muscles, and later the motor centres and the motor nerve endings of the respiratory muscles. In case of poisoning, therefore, artificial respiration must be resorted to.

Internally employed in doses of $\frac{1}{64}$–$\frac{1}{32}$, gradually increased, in aqueous or alcoholic solution, for rheumatic and traumatic tetanus, rabies, epilepsy, and strychnine poisoning. It must be used with the greatest caution, and, on account of the unreliability of the different preparations, only after testing on animals.

Subcutaneously the dose is gr. $\frac{1}{64}$ very cautiously increased up to a total of gr. $\frac{1}{3}$ in the twenty-four hours; for this purpose a solution is used of gr. iss. in ʒ iiss. of distilled water to which 1 drop of hydrochloric acid is added.

Endermically a small quantity of a solution of gr. iss. in ʒ x. of distilled water is applied to the wound which has given rise to the tetanus.

DATURINA.

Externally employed to dilate the pupil, in drop instillations into the eye of a solution of gr. i. in ♏ lxxx. of water acidulated with dilute sulphuric acid. The sulphate of daturine is used for the same purpose and in the same manner.

DECOCTA.

The United States Pharmacopœia directs that decoctions the strength of which is not otherwise specified shall be prepared by adding to 10 parts of the substance, coarsely comminuted, 100 parts of cold water, and boiling for fifteen minutes in a closed vessel; it is then cooled to 113° F. and strained, and enough water is passed through the strainer to make the product weight 100 parts. The caution is added that, in the case of energetic or powerful substances, the strength of the decoction should be specified by the physician.

DEXTRINUM.

See Amylum.

DIGITALIS.

(*Conf.* Scilla, and Strophanthus.)

The leaves of Digitalis purpurea (foxglove), which in the fresh state and in powder are nearly one-third more active

than in infusion, as well as the glucosides (digitalin, digitalein, and digitoxin), the employment of which is not to be recommended, are a specific heart poison with a cumulative action. The drug is in general indicated in conditions of protracted cardiac weakness and their consequences. As regards its action three stages may be distinguished: 1. Increased energy of the individual contractions of the heart with the resulting increase in blood pressure and slowing of the pulse (the effect of small doses, gr. ss.–i. of the leaves); 2. Increased frequency of the pulse, and first increase, then lowering of the blood pressure (produced by the administration of larger doses, gr. iss.–iij., continued for a longer or shorter period); 3. The pulse becomes irregular, smaller, and less frequent, and the blood pressure diminishes.

Large doses, or the long-continued administration of smaller ones (cumulative action), lead not seldom to symptoms of poisoning. These are, in the beginning and in the milder form, loss of appetite, nausea, the appearance of specks before the eyes; in more serious cases, dryness of the throat, excessive nausea, vomiting, purging, headache, vertigo, dilatation of the pupils, disturbances of sight and hearing, arythmic (too rapid or too slow) pulse, lowering of temperature, extreme muscular weakness, and collapse. The treatment of digitalis poisoning consists in the administration of tannin, stimulants, ether, etc. The effect of the drug is noticeable for several days after its administration has been discontinued.

Contra-indications.—A hard pulse, and, for the larger doses, weakness and degeneration of the heart muscle.

Internally employed in doses of gr. ss.–iss. (maximum dose, gr. iij., or gr. xv. pro die), best given in powder in wafers followed by copious draughts of water, or in infusion. The necessary daily dose for an adult is gr. viij., at most gr. xv., which may be continued until 30 to 45 grains in all have been taken, or until either the desired effect is obtained or symptoms of poisoning declare themselves. In the latter case the drug is discontinued until all these symptoms have disappeared, when it is again given, and so on for two or three times. The action of digitalis varies greatly in different individuals.

The *indications* for the administration of digitalis are:

1. Valvular lesions, with very excited heart action, irregu-

lar pulsations, increased apex beat, and dyspnœa; also valvular lesions with weakened heart and resulting dropsy, diminished secretion of urine, dyspnœa, and a rapid, irregular, small, and flabby pulse. (Here quinine and iron are also called for.) Nervous palpitation without valvular lesions, Basedow's disease, simple dilatation of the heart, with venous engorgement, asthmatic difficulty, and emphysema, with dyspnœa and catarrh. Finally weak heart action and circulatory disturbances and their consequences, occurring independently of valvular troubles.

2. As a diuretic in dropsy referable to weakened heart action consequent upon disease of the kidneys.

3. As an antipyretic and antiphlogistic in acute fevers with high temperature and rapid pulse, the use of the drug is indeed recommended, but, and especially in pneumonia, not justly; for digitalis acts very slowly, and small doses are generally useless, while large ones are dangerous because of their weakening effect upon the heart, where paralysis is already threatening, and their tendency to disorder the digestion.

Acetum Digitalis.—Given in doses of 10 to 30 drops several times a day in water or mixed with simple syrup.

Tinctura Digitalis.—*Internally* employed in doses of 5 to 20 drops several times a day in saturation, or mixed with equal parts of bitter almond water, for palpitation of the heart and the catarrhal troubles associated with heart disease; also with equal parts of tincture of squill in dropsy. Maximum dose, ♏ xxiv. (♏ lxxv. pro die).

Tinctura Digitalis Ætherea.—Is much stronger than the preceding, and is therefore used in only about half the dose, either pure or added to diuretic mixtures.

Digitalinum.—Occurs in two forms, amorphous and crystallized, the dose of the former being gr. $\frac{1}{64}$ to $\frac{1}{32}$ two or three times a day in powder or pellets, that of the crystallized gr. $\frac{1}{300}$ to $\frac{1}{100}$, two or three times a day. Amorphous digitalin has been employed subcutaneously in doses of gr. $\frac{1}{20}$ to $\frac{1}{12}$ in glycerin in palpitation of the heart. The use of digitalin is not to be recommended.

Extractum Digitalis.—*Internally* employed in doses of gr. ss.–iij. several times a day (maximum, gr. xv. pro die) in pill or solution to meet the indications above mentioned.

℞ Infus. digitalis, ... ℥ v.
Potassii et sodii boro-tart., . . . ʒ iv.–vi.
(Spt. ætheris nitros., ... ʒ ss.)
Syr. simplicis, ... ʒ vi.

M. S. One to two teaspoonfuls every two hours. (Heart stimulant, and an excellent diuretic.)

℞ Infus. digitalis, ... ℥ ss.
Potassii acetatis, ... ʒ vi.
Aceti scillæ, ... ʒ vi.
Oxymel. scillæ, ... ʒ xij.

M. S. One teaspoonful every two hours. (Cardiac dropsy, nephritis.)

℞ Pulv. digitalis, ... gr. xv.
Pulv. rhei, ... gr. xlv.
Ext. gentianæ, ... q. s.

M. et ft. pil. No. 20. S. One pill every three hours. (Heart diseases.)

℞ Pulv. digitalis,
Plumbi acetat., ... āā gr. iij.
Morphinæ hydrochlor., ... gr. i.
Sacch. albi, ... gr. x.

M. et div. in chart. No. 10. S. One powder every hour or two in hæmoptysis.

℞ Tinct. digitalis,
Aq. amygdal. amaræ, . . . āā ʒ i.
(Tinct. opii, ... ʒ i.)

M. S. Twenty drops three times a day. (Palpitation, catarrhal troubles associated with heart disease.)

℞ Digitalini (German), ... gr. ⅓
Alcoholis, ... q. s.
Pulv. althææ, ... ʒ ss.
Mucil. acaciæ, ... q. s.

M. et div. in pil. No. 20. S. One pill two or three times a day.

DIURETINUM.

See Theobrominum.

DUBOISIA.

The leaves and extract of duboisia are not used in medicine, but from them is made.

Duboisina.—This is employed like its sulphate.

Duboisinæ Sulphas.—Identical with hyoscyamine and daturine, and isomeric with atropine, but its action is more powerful, though of shorter duration, than that of the latter, and it is also less irritating to the conjunctiva.

Internally employed in alcoholic solution in two-thirds the dose of atropine, gr. $\frac{1}{300}$ to $\frac{1}{75}$ two or three times a day (maximum single dose, gr. $\frac{1}{64}$, or gr. $\frac{1}{20}$ pro die), in the colliquative sweats of phthisis, and also as a mild hypnotic in mania. Duboisine is an antidote to pilocarpine and an antagonist of muscarine.

Externally used as a mydriatic in a one-quarter to one-half per cent solution.

Subcutaneously, in doses of gr. $\frac{1}{300}$ to $\frac{1}{75}$ for the night sweats of phthisis, and in the minimum dose continued for six or seven days in Basedow's disease.

DULCAMARA.

Internally employed in doses of gr. viij.–xxx. several times a day in powder or infusion as an expectorant. It has also been recommended in the treatment of chronic skin diseases, gout, and rheumatism.

Extractum Dulcamaræ.—*Internally* given in doses of gr. iij.–xxiv. in pill or solution.

ELÆOSACCHARA.

Oil-sugars are made by triturating ♏xv. (25 drops) of a volatile oil with ʒ xij. of pulverized sugar.

ELIXIR GLYCYRRHIZÆ, SEU PECTORALE.

See Ammonii Anisati Liquor.

ELIXIR ROBORANS WHYTTII.

See Cinchona (Tinctura Composita).

EMPLASTRA.

The various plasters are employed according to their composition and mode of preparation:

1. For surgical use in keeping the edges of wounds and

granulating surfaces in apposition, retaining dressings in place, and making compression.

2. As a protective application to the skin.

3. As excipients of medicinal substances whose action on the skin is desired.

The officinal plasters (U. S. P.) are: E. ammoniaci, ammoniaci cum hydrargyro, arnicæ, assafœtidæ, belladonnæ, capsici, ferri, galbani, hydrargyri, ichthyocollæ (court plaster), opii, picis burgundicæ, picis canadensis, picis cum cantharide, plumbi (diachylon), resinæ (adhesive plaster), and saponis.

EMULSIONES.

Emulsions are milky fluids in which the insoluble active substance (oily or resinous) is held suspended and diffused through the liquid in very fine subdivision, by means of some mucilaginous substance.

Seed-emulsions, when not otherwise specified, are made with 1 part of the finely ground seed in water, enough to make, after straining, 10 parts.

Oil-emulsions are made from 2 parts oil, 1 part gum arabic, and 17 parts of water. If an oily emulsion (emulsio oleosa) is prescribed it is made with almond oil instead of water (German pharmacopœia).

EPHEDRINA.

An alkaloid obtained from Ephedra vulgaris, the hydrochlorate of which produces mydriasis in instillations of 1 or 2 drops of a ten-per-cent solution.

ERGOTA.

The sclerotinum of Claviceps purpurea, a fungus replacing the grain of Secale cereale or rye (Secale cornutum). Should not be kept in fine powder, but should always be freshly prepared from the coarsely broken grains, and in no case should be kept in stock more than a year. It causes contraction of the peripheral arteries and of smooth muscular tissue generally. Its action upon the uterus appears to be due in part to an induced anæmia of the uterine centre in the cord and in part to a direct influence upon the uterine muscle. It may act injuri-

ously upon the child in utero by interfering with the fœtal circulation, when it has been given in such doses that the uterus undergoes no relaxation between the pains.

Large doses (ʒ i. and more) cause acute poisoning, manifested by nausea, vomiting, salivation, colic, and diarrhœa, dyspnœa, numbness, and formication of the extremities, convulsions, and collapse. Chronic poisoning, sometimes arising from an admixture of ergot in rye flour, is shown by ataxic symptoms, cramps of various forms, and psychoses; also cachectic symptoms with gangrene of the peripheral parts. The treatment of acute poisoning consists in the production of vomiting and purging, and the administration of tannin internally and nitrite of amyl by inhalation; for chronic poisoning, warm baths, narcotics, and a nourishing diet.

Internally employed in doses of gr. v.–viij. up to the maximum of gr. xv. (gr. lxxv. pro die) in powder, less frequently in pills or suspension, and occasionally also in infusion or decoction.

1. In dystocia from ineffectual pains (*conf.* Opium) in doses of gr. viij.–xv. every fifteen or thirty minutes, but never before full dilatation of the os, and only in cases of head presentation and normal pelvis. (Beware in cases of placenta prævia.)

2. In retained placenta from insufficient uterine contraction, and also as a prophylactic, given just at the completion of labor, to prevent atonic post-partum bleeding; further, during the puerperal period, to favor involution of the uterus.

3. In internal hemorrhages (lungs, stomach, intestine), but here the hypodermic method of administration is preferable.

4. In paralysis of the bladder in doses (especially if it is to be long continued) of gr. iss.–v. several times a day in powder or infusion. It is still more efficacious if given in the form of injection (4 grains of the extract) in the previously emptied bladder.

The action of ergot, which has been so favorably spoken of, in heart troubles, diseases of the spinal cord, intestinal catarrh, dysentery, whooping-cough, etc., is at least uncertain.

Subcutaneously ergotin is employed (*a*) in the treatment of aneurism, varicose veins, and varicocele, an injection being made between the skin and the wall of the vessel every other day.

b. Injected into the abdominal wall to cause a reduction in size of uterine fibroids, or more commonly to arrest hemorrhage excited by their presence.

c. In atony of the bladder and hypertrophy of the prostate.

Extractum Ergotæ.—*Internally* employed in doses of gr. iss.–viij. in pill or solution; subcutaneously gr. i.–iiss. or more (see formula). The place where the injection has been made usually remains swollen and painful for several days.

Extractum Ergotæ Fluidum.—*Internally* and subcutaneously employed in doses of 10 to 20 drops or more. It is well borne by the stomach.

Ergotinum.—Bonjean's ergotin, a purified aqueous extract of ergot (officinal in the B. P.). Denzel's is the preparation most used in Germany. It is well borne by the stomach. Used to arrest profuse menstruation (see formula).

Tinctura Hæmostyptica.—The Fritsch-Denzel hemostyptic tincture is employed in the treatment of profuse menstruation of young girls, in chlorosis, at the climacteric period, and after childbirth, in doses up to two tablespoonfuls a day. One teaspoonful of the tincture represents 6 grains, a tablespoonful 24 grains of ergot.

Tinctura Ergotæ.—Employed in doses of 15 to 50 drops (of a ten-per-cent tincture) with tincture of cinnamon.

Cornutina.—An alkaloid obtained from ergot, which causes spasm and contraction of the uterus, and has been employed in doses of gr. $\frac{1}{12}$ to $\frac{1}{6}$. Acidum ergotinicum is less efficacious as an ecbolic, and is said to lower arterial pressure and act as a paralyzant of the spinal cord.

Acidum sphacelicum is a third constituent of ergot, which is said to act directly upon the pregnant uterus, and also to cause gangrene. Of these three only cornutine has been employed, but the action of none of them is as yet sufficiently known.

℞ Infus. ergotæ (gr. lxxv. ergot), . . ℥ iv.
(Plumbi acetat., ... gr. viij.)
Syr. simplicis, ... ʒ v.

M. S. One tablespoonful every two hours. (Without the acetate of lead for inefficient pains; with it in hemorrhage from the bladder, and night-sweats, in the latter two or three tablespoonfuls at night.)

℞ Extr. ergotæ,
Quin. sulphat., ... āā ʒ ss.
Pulv. digitalis,
Ext. hyoscyami, ... āā gr. iij.
M. et ft. pil. No. 20. S. Five to ten pills a day. (Hæmoptysis and metrorrhagia.)

℞ Extr. ergotæ, ... gr. xxiv.
Acidi tannici, ... ʒ ss.
Syr. simplicis, ... ℥ i.
Aq. destillatæ, ... ℥ vi.
M. S. A tablespoonful every hour. (Hæmaturia.)

℞ Extr. ergotæ,
Acidi tannici, ... āā gr. xx.
Extr. opii, ... gr. v.
Ext. glycyrrhizæ, ... q. s.
M. et ft. pil No. 20. S. One pill every two to three hours. (Hæmoptysis.)

℞ Extr. ergotæ, ... gr. xl.
Alcohol,
Glycerini,
Aq. destill., ... āā ʒ i.
M. S. For hypodermic injection. (Eight to 15 drops.)

℞ Ergotini, ... ʒ ss.
(Acid. carbol. liquefacti, ... ♏ ij.)
Aq. destillatæ, ... ʒ iiss.
M. S. For hypodermic injection in doses of 8 to 15 drops.

℞ Extr. ergotæ, ... gr. l.
Pulv. digitalis, ... ʒ ss.
Pulv. et extr. gentian., ... q. s.
M. et ft. pil. No. 50. S. Two or three pills every two or three hours. (Hemorrhage from the lungs or uterus; aortic insufficiency?)

℞ Ergotini,
Ergotæ, ... āā gr. l.
M. et ft. pil. No. 100. S. Six pills a day.

℞ Ergotini,
Extr. hydrastis inspiss.,
Ext. gossypii inspiss., . . . āā gr. l.
M. et ft. pil. No. 100. S. Three times a day.

ERYTHROXYLON.

The leaves of the Erythroxylon Coca. A stimulant and tonic.

Internally employed (rarely) in doses of gr. v.–xv. several times a day in powder, infusion, or decoction as a stimulant tonic. Chewing coca leaves (as practised by the natives of some portions of South America) is said to remove the sensations of hunger, thirst, and fatigue, to give the power of great and long-continued exertion, and to impart a sense of well-being.

Extractum Erythroxyli Fluidum.—*Internally* employed in doses of ʒ ss.–ij. in mixtures.

Tinctura Erythroxyli.—*Internally* employed for whooping-cough in doses of 6 to 10 drops for infants up to the age of three months, 10 to 15 drops for infants from four to fifteen months old, and 20 to 25 drops for older children.

(See Cocainæ Hydrochloras.)

ESERINÆ SALICYLAS AND SULPHAS.

See Physostigma.

EUCALYPTUS.

Antiperiodic, antiseptic, and anticatarrhal.

Internally employed in the dose of ʒ iiss. pro die in powder, infusion, or decoction, in intermittent fever and all periodic affections attended with enlargement of the spleen; in daily dose of ʒ i. in catarrhal troubles as an expectorant.

Externally in powder or infusion as a disinfectant application; as a mouth-wash and gargle in stomatitis and sore throat; by injection, in the form of infusion, in fistulas, gonorrhœa, leucorrhœa, and coryza; and in rectal injection for dysentery and ulceration of the rectum. The leaves are smoked, or burned like nitre paper, for the relief of asthma.

Extractum Eucalypti Fluidum.—*Internally* employed in doses of ♏ xv.–ʒ i. pure or in mixture in intermittent fever during the apyrexial period, and also in chronic bronchial catarrh with offensive expectoration. In pertussis it is given in doses of 2 to 4 drops every three hours for children one to four years old. It is especially recommended in croup, after

emesis has been produced, in teaspoonful doses of a mixture of ʒ i. in ℥ i. of simple syrup.

Externally applied, in dilution, as a dressing to wounds.

Tinctura Eucalypti.—Employed like the preceding in doses of about twice the size.

Oleum Eucalypti.—*Internally* employed in doses of gtt. iij.–xv. several times a day (ʒ i. pro die) in pills, capsules, or oil-sugar for the above-mentioned indications.

Externally used to impregnate antiseptic dressings in an emulsion (oil of eucalyptus, 3 parts; alcohol, 15 parts; water, 115 parts); or in the manufacture of gauze (1 part oil of eucalyptus to 3 parts each of resin and paraffin). Oil of eucalyptus is said to mask the odor of iodoform.

For inhalations an emulsion of the oil in mucilage and water is used, or a mixture of ℥ ss. each of ol. eucalypti and ol. templini (Pinus Pumilio) with gtt. x. of ol. lavandulæ. An inhalation of 10 to 15 drops in a vessel of hot water is employed in pulmonary gangrene and putrid bronchitis.

Eucalyptolum.—Eucalyptol is a thin, bright yellow oil obtained by distillation of the preceding over caustic potash.

Internally employed in doses of gtt. iij.–xv. pure on sugar or in pills or capsules, to meet the indications above given, and also in small doses as a stimulant.

Externally as a disinfectant, and for the relief of pain; a few drops applied on flannel, or a liniment (1 part to 5 of olive oil; 1 part to 1½ glycerin and 2 soap or 6½ alcohol).

An antifermentative mixture is made of 1 part each of tincture of eucalyptus and alcohol, and 6 parts of salicylic acid.

EUONYMUS.

The bark of Euonymus atropurpureus, employed as a cholagogue cathartic in diseases of the liver.

Extractum Euonymi.—Employed in doses of gr. i.–v. in pill, with extract of belladonna, after eating, and followed by a saline cathartic the following morning.

Extractum Euonymi Fluidum.—Given in doses of a teaspoonful after the noon-day, and if necessary the evening, meal.

Euonyminum.—A resinous bitter principle obtained from the bark, which is given in doses of gr. i.–v. for the same purposes as the extract. It is said to be less irritant to the in-

testine than podophyllin, but to be a powerful heart poison in large doses.

EXALGINUM.

Exalgin (methylacetanilid) is a crystalline body readily soluble in hot water and alcohol, but sparingly so in cold water. An analgesic remedy.

Internally employed in doses of gr. iv.–viij. from one to three times a day, as may be needed, in powder or solution (a dose of 4 grains of exalgin is equivalent to 15 gr. antipyrine or a hypodermic injection of $\frac{1}{6}$ grain morphine), for headache, migraine, trigeminal neuralgia, toothache, earache (abscess of the ear), the lancinating pains of tabes, etc. It is less efficacious in rheumatism, sciatica, severe hysterical pains, and psychic disturbances. It is not uncommon to find produced, fifteen to thirty minutes after a dose of exalgin has been taken, transitory vertigo and a sensation as if intoxicated, specks before the eyes, tinnitus aurium, etc., and also sweating, cyanosis, and a skin eruption.

℞ Exalgini, ... gr. xl.
Spt. menth. pip., ... ʒ i.
Syr. aurant. cort., ... ℥ i.
Aq. destillatæ, ... ℥ iv.
M. S. One tablespoonful morning and evening.

FERRUM.

The iron which is contained in the blood (about 45 grains in the blood of a healthy individual) is necessary for the formation of the red corpuscles (hæmoglobin), and as it is continually being lost, must be continually replaced; this is usually effected through the iron contained in the food, which should be in the amount of 8 to 15 grains a day. But when the destruction of the red blood-corpuscles is too great to be made good in this way, the medicinal employment of iron is indicated. It must be remembered, however, that only a small proportion of the iron introduced into the stomach is absorbed, whatever preparation may be used; the greater part passing away as an insoluble sulphate in the stools which it stains a blackish-green or black. It is, therefore, advisable to change the preparation from time to time until that one which

is most easily digested in the particular case is found, and also always to give only small doses, not more than 1½ grain several times a day.

The conditions necessary to obtain good results from the use of iron are, long-continued administration, only during the time of digestion, and combined with a nourishing diet.

Iron baths are useless, since the drug is not absorbed through the skin. But the drinking of chalybeate waters, especially a "cure" at some chalybeate spa, is strongly to be recommended, not only because iron waters are usually well borne, but also because their use is attended ordinarily by dietetic conditions favorable to good nutrition.

For subcutaneous use the citrate of iron, and the pyrophosphate with citrate of sodium or ammonium, in ten-per-cent solution, are the best, since they are followed by only transitory pain and do not cause abscess.

The use of iron is contra-indicated, or should be undertaken with great caution, in inflammatory and feverish conditions, in the so-called tuberculous habit, and when there is a tendency to frequent nose-bleed and other hemorrhages in pulmonary phthisis; in organic valvular lesions of the heart; catarrhal gastritis (not, however, in atonic dyspepsia); diarrhœa; and for some days before appearance of the menstrual flow, in cases in which it is apt to be profuse.

Indications for the use of iron (substances containing tannic acid should be avoided when iron is being taken):

1. The so-called anæmic and cachectic conditions, especially chlorosis, following the loss of blood (except hæmoptysis), or the anæmia caused by severe fevers; anæmic and cachectic dropsy; amyloid degeneration (combined here with iodine); so-called scrofula and rickets associated with anæmia; amenorrhœa.

2. Various neuroses when they rest upon an anæmic foundation; hysteria, epilepsy, etc.

From the great number of iron preparations, many of which are entirely superfluous, we select here only those most used and most to be commended (both officinal and non-officinal), and among them the astringent and styptic preparations and those employed as antidotes.

FERRI ACETATIS LIQUOR.

Contains about five per cent of iron. It is not much used except to make the following preparation.

Tinctura Ferri Acetatis Ætherea (Klaproth's Tincture of Iron).—Composed of 1 part each of alcohol and acetic ether, and 8 parts of solution of acetate of iron, containing about 4 parts of iron in 100. It is given in doses of 20 to 60 drops several times a day, in water or syrup, for chlorosis, etc.

FERRI ALBUMINATI LIQUOR.

Internally employed as a mild and readily absorbed chalybeate, in doses of 5 to 20 drops for children, one-half to one teaspoonful for adults, three times a day in half a glass of warm milk. It is also strongly recommended in gastric ulcer.

FERRI BROMIDI LIQUOR.

Contains ten per cent of iron, and is given in doses of ♏i.–iv. every three or four hours in dysmenorrhœa, chronic diarrhœa, leucorrhœa, priapism, and pollutions.

℞ Liq. ferri brom., ... ʒiiss.
Syr. aurant. cort., ... ℥i.
Aq. destillatæ, ... ℥ij.
M. S. One tablespoonful in the morning, and two or three at night. (Frequent erections and pollutions in anæmic patients with gonorrhœa.)

℞ Liq. ferri brom., ... ℥ss.
Ferri pulv., ... gr. iss.
Evap. in baln. vapor. ad reman. ♏lxxx.
Acaciæ,
Pulv. glycyrrhizæ, ... āā q.s.
M. et ft. pil. No. 100. (Each pill contains $\frac{1}{6}$ grain of bromide of iron.)

FERRI CARBONAS SACCHARATUS.

Contains ten per cent of iron, and is readily absorbed in doses of gr. iij.–viij. in powder or pastilles.

Massa Ferri Carbonatis.—Vallet's mass, composed of sulphate of iron, carbonate of sodium, clarified honey, and

sugar. It may be made up into pills, with powdered althæa and water, each containing gr. ½ of iron, and given in doses of five pills three times a day. A very mild preparation.

Pulvis Aerophorus Martialis.—Composed of 1 part saccharated carbonate of iron in 10 parts effervescing powder; to be taken in doses of one teaspoonful in half a pint of water.

℞ Ferri carb. sacch.,
Sacch. albi,
Sodii bicarb., ... āā ʒ iss.
Pulv. myrrhæ,
Pulv. rhei, ... āā ʒ i.

M. et ft. pulvis. S. Take as much as can be lifted on the tip of a knife-blade, three times a day. (Chronic catarrhal troubles.)

℞ Ferri carb. sacch., ... ʒ i.
Extr. glycyrrh., ... gr. xv.

M. et ft. pil. No. 30. S. Two to five pills three times a day.

FERRI CHLORATI LIQUOR.

Solution of ferrous chloride, containing ten per cent of iron, may be given internally in doses of 5 to 20 drops several times a day in syrup or wine. Externally it is used for baths, in the proportion of 2 to 4 ounces for each bath. Employed in the preparation of the following.

Tinctura Ferri Chlorati Ætherea.—Bestuscheff's tincture, composed of 1 part solution of ferrous chloride, 2 parts of ether, and 7 parts of alcohol. Given in doses of 10 to 40 drops several times a day, in aromatic water, syrup, white wine, or mixture, for anæmia, chlorosis, hysteria, etc.

FERRI CHLORIDUM.

Ferric chloride is an orange-yellow crystalline preparation, soluble in water and alcohol. It is employed to make—

Liquor Ferri Chloridi.—An astringent and styptic. Employed internally in repeated doses of 2 to 8 drops in a mucilaginous vehicle in hemorrhages of the stomach and intestine, in smaller, greatly diluted doses for long-continued use as a simple chalybeate in anæmia and chlorosis, and in doses of 5 to 10 drops three times a day against enuresis in children.

Externally as a uterine injection (℥ i.–℥ iij. of water) in traumatic hemorrhage and metrorrhagia; and also in septic conditions of the puerperal uterus, with foul-smelling lochia, when the iron is to be followed by antiseptic injections for several days to remove all the clots. It is employed in diluted form as a nasal injection in epistaxis; and undiluted as an injection for varicose veins, aneurisms, and goitre, but this is a very dangerous procedure. The undiluted solution is employed as an application to frost-bites and warts. In persistent hæmoptysis inhalations of a one to four-per-cent solution have been employed.

Tinctura Ferri Chloridi.—The muriated tincture of iron, prepared by adding 35 parts of liquor ferri chloridi to 65 parts of alcohol and allowing the mixture to stand in a covered vessel for three months, is preferable to the liquor for internal use. It is given internally in doses of 5 to 30 drops three times a day to meet the indications given above for the solution of the chloride of iron.

Gossypium Hæmostaticum.—Absorbent cotton is dipped in water, thoroughly squeezed, and then dipped in solution of the chloride of iron, and again compressed so as to expel as much as possible of the fluid. It is employed as a styptic application to small bleeding wounds.

℞ Tinct. ferri chloridi, ... ℥ ss.
(Tinct. opii, ... gtt. x.)
Syr. aurant. cort., ... ℥ v.
Aq. melissæ, ... ℥ v.
M. S. A tablespoonful every two hours. (Hæmoptysis, hemorrhage of the stomach, and intestinal hemorrhage in typhoid fever.)

℞ Liq. ferri chloridi, ... ℥ i.
Glycerini, ... ℥ ij.
Ol. bergamot., ... gtt. xx.
M. S. For painting the feet in bromidrosis.

℞ Tinct. ferri chloridi, ... gtt. x.
Glycerini, ... ℥ ij.
Aq. destillatæ, ... ℥ iij.
M. S. A dessertspoonful every two hours. (Gastro-intestinal catarrh of children.)

℞ Liq. ferri chloridi, ... gtt. x.–xv.
Tragacanthæ, ... q.s.
M. et ft. bacillus. S. A pencil one-half to three-quarters of an inch in length to be introduced into the cervix in cases of uterine hemorrhage.

FERRI CITRAS.

Ferri Citras Effervescens. Ferri et Ammonii Citras.—These three preparations, mild and readily absorbed, are employed in the same manner and to meet the same indications.

Internally in doses of gr. iss.–x. from two to four times a day in pill, powder, or solution.

For hypodermic use the citrate only is employed in ten-per-cent solution.

℞ Ferri citratis, ... gr. xl.
Syr. aurant. cort.,
Aq. destillatæ, ... āā ℥ iss.
M. S. One tablespoonful three times a day.

℞ Ferri citratis, ... ʒ ss.
Sodii bicarb.,
Sacch. albi, ... āā ʒ iiss.
M. et div. in chart. No. 10. S. One powder three times a day.

℞ Ferri citrat. effervesc., ... ʒ iss.
Quininæ hydrochlor., ... gr. lxxv.
Pulv. rhei, ... q.s.
M. et ft. pil. No. 90. S. Two to four pills three times a day. (Chlorosis.)

FERRI ET POTASSII TARTRAS.

Internally employed in doses of gr. v.–x. several times a day in pills or solution. A very pleasant artificial chalybeate water is made by dissolving 15 grains of tartrate of iron and potassium and 75 grains each of bicarbonate of sodium and tartaric acid in a quart bottle of water, or by adding 8 grains to a bottle of Seltzer water. For iron baths, 10 to 12 ounces may be dissolved in each bath.

℞ Ferri et potassii tartr., ... ʒ iss.
Ext. glycyrrhizæ, ... ʒ i.
Mucil. acaciæ, ... q.s.

M. et ft. pil. No. 60. S. Three or four pills three times a day. (Anæmia and chlorosis.)

FERRI ET QUININÆ CITRAS.

See Quininæ Ferro-Citras, under Cinchona.

FERRI ET SODII PYROPHOSPHAS.

Internally employed in doses of gr. ij.–v. several times a day in pill or solution (gr. xv.–xxx. in ʒ iij. of water with simple syrup). It is recommended as one of the best and most easily assimilated of the iron preparations. It is usually exhibited in the form of an artificial chalybeate water (with 1 grain of iron in every 5 ounces).

℞ Ferri et sodii pyrophos., ... gr. xxiv.
Aq. aurant. flor., ... ℥ x.
Syr. simplicis, ... ℥ iss.

M. S. A wineglassful morning and evening.

℞ Ferri et sodii pyrophos.,
Cacao ab oleo liberat.,
Sacch. albi, ... āā gr. xl.
Mucil. acaciæ, ... q.s.

M. et ft. pil. No. 50. S. Three pills half an hour before each meal.

FERRI IODIDUM.

Should always be freshly prepared by evaporation of the liquor ferri iodidi.

Internally employed in doses of gr. i.–iij. (gr. viij. pro die) in pills, in syphilis, scrofula with anæmia, Bright's disease, and malarial cachexia.

Externally in ointment (2 parts in 10 parts of lard), and in baths ʒ vi.–xij. per bath.

Liquor Ferri Iodidi Saccharati.—Made with water 50 parts, iodine 41 parts, and enough powdered iron to give a greenish color to the solution, which when filtered contains fifty per cent iodide of iron.

Internally employed in doses of 5 to 10 drops several times a day.

Syrupus Ferri Iodidi.—Contains ten per cent of the iodide of iron. Given in doses of 15 to 40 drops several times a day pure, in simple syrup, or in mixture, to anæmic, scrofulous, or syphilitic children.

℞ Ferri iodidi sacch.,
Sacch. lactis, ... āā gr. lxxx.
Mucil. acaciæ, ... q. s.
M. et ft. pil. No. 100. S. Five pills three times a day.

℞ Syr. ferri iodidi, ... ʒ iv.
Syr. simplicis, ... ℥ iij.
M. S. A teaspoonful to a tablespoonful three times a day.

℞ Iodi,
Pulv. ferri,
Mel. despumat., ... āā gr. lxxx.
Pulv. glycyrrh., ... ʒ ij.
M. et ft. pil. No. 100. S. One to five pills three times a day.

℞ Syr. ferri iodidi, ... ℥ i.
Syr. simplicis, ... ℥ iss.
Aq. destill., ... ℥ iiiss.
M. S. A teaspoonful to a tablespoonful three times a day.

FERRI LACTAS.

An easily assimilated preparation, given in doses of gr. iss.–xii. in powder or pills.

℞ Ferri lactatis,
Elæosacch. cinnamomi, ... āā gr. xlv.
M. et div. in chart. No. 10. S. One powder morning and evening after meals.

℞ Ferri lactatis, ... ʒ ss.
Myrrhæ, ... gr. xv.
Ext. gentianæ, ... q.s.
M. et ft. pil. No. 50. S. Two pills three times a day. (Amenorrhœa, chlorosis, bronchiectasis.)

℞ Ferri lactatis, ... ʒ ss.
Extr. aloes,
Pulv. rhei, ... āā ʒ i.
M. et ft. pil. No. 100. S. Three pills morning and evening. (Chlorosis with constipation.)

℞ Ferri lactatis,
Ext. glycyrrh., ... āā gr. lxxx.
M. et ft. pil. No. 100. S. Two to five pills three times a day.

FERRI OXIDUM SACCHARATUM.

A red, sweet-tasting powder, containing three per cent iron, given pure in doses of gr. viij.–xlv. a day to marasmic, scrofulous, anæmic children; and as a tonic for children and adults during convalescence from exhausting diseases, where the digestion is poor.

Syrupus Ferri Oxidi Solubilis.—Contains one per cent iron. Employed, like the preceding, as a tonic in doses of ½ to 2 drachms a day. As an antidote to arsenical poisoning in doses of a teaspoonful every fifteen minutes.

FERRUM PEPTONATUM DIALYSATUM.

Readily assimilated. Contains eighty per cent iron and twenty per cent peptone. Given in doses of gr. iss.–viij. in pills.

Ferrum Peptonatum Siccum.—Is employed like the preceding.

Liquor Ferri Peptonati.—Given in doses of 5 to 20 drops three times a day.

FERRI PHOSPHAS.

Recommended in the treatment of rachitis, in doses of gr. ij.–viij. three times a day.

FERRI POMATI EXTRACTUM.

A very soluble preparation, made by digesting iron filings in the pulp of sour apples. Containing seven to eight per cent iron. It should not be given with alkaline salts or strong acids. Dose, gr. v.–x. several times a day in pills or solution.

Tinctura Ferri Pomati.—Composed of 1 part extractum ferri pomati and 9 parts aqua cinnamomi (the latter contains ten per cent alcohol). Given in doses of 10 to 60 drops in bitter tincture several times a day. It is easily assimilated, but special care must be taken of the teeth during its use.

℞ Extr. ferri pomati,
Pulv. cinchonæ, ... āā gr. lxxx.
M. et ft. pil. No. 100. S. Six pills three times a day.

℞ Tinct. ferri pomati, ... ʒi.
Tinct. rhei, ... ʒiiss.
Aq. amygdal. amaræ, ... ʒss.
M. S. One teaspoonful three or four times a day.

FERRUM PULVERATUM.

Pulverized iron (Limatura Martis), containing at least ninety-eight per cent iron, is given in doses of gr. iss.–v. (ʒss. a day) in aromatic powder or pills.

℞ Ferri pulv.,
Pulv. calami,
Pulv. cinnamomi, ... āā ʒi.
M. et div. in chart. No. 20. S. One powder three times a day.

℞ Ferri pulv., ... ʒi.
Pulv. cinnamomi, ... ʒss.
Extr. cardui bened., ... q.s.
M. et ft. pil. No. 60. S. Three or four pills three times a day.

FERRI PYROPHOSPHAS.

A readily assimilated preparation given in doses of gr. iss.–viij. A chalybeate water may be made by dissolving 2 to 10 grains in a quart bottle of carbonated water.

A ten-per-cent solution of pyrophosphate of iron with citrate of ammonium is recommended for subcutaneous use.

FERRUM REDUCTUM.

Occurs in the form of a very fine powder, the most easily digestible and in so far the best preparation of iron.

℞ Ferri reducti, ... ʒss.
Pulv. cinchonæ,
Elæosacch. menth. pip., . . . āā ʒiiss.
M. et div. in chart. No. 20. S. One powder morning and night.

℞ Ferri reducti, ... gr. xl.
Seminis cacao ab oleo liberati,
Sacch. albi, ... āā gr. lxxx.
Mucil. acaciæ, ... q.s.

M. et ft. pil. No. 100. S. Two to five pills three times a day.

FERRI SULPHAS.

Ferrous sulphate, soluble in 2 to 8 parts of water, is a favorite remedy in chlorosis. It is given in doses of gr. i.–iv. several times a day in powder, pills, or pastilles. It is also used in baths in the proportion of ʒ i.–ij. to each bath.

Ferri Sulphas Exsiccatus.—Dried sulphate of iron is like the preceding, but is more constant and concentrated, and should therefore be employed in half the dose, namely, gr. ss.–ij.

Ferri Sulphas Crudus.—Commercial sulphate of iron is employed for the disinfection of privy vaults, etc. One pound dissolved in about three pints of water suffices for the disinfection of five to ten cubic feet of the contents of a vault. Six drachms in 8 ounces of water suffices for the average daily fecal discharges of one individual. The so-called Vienna disinfectant solution consists of 6 ounces of crude sulphate of iron and 3 ounces of commercial carbolic acid in 2 quarts of water.

Liquor Ferri Subsulphatis.—Monsel's solution, solution of basic ferric sulphate, is employed as a styptic.

Liquor Ferri Tersulphatis.—The solution of normal ferric sulphate is used in the manufacture of many of the other iron preparations, among others the

Ferri Oxidum Hydratum cum Magnesia.—A brownish homogeneous mass made by shaking a mixture of magnesia in water with a solution of tersulphate of iron, used as an antidote in arsenical poisoning. It should be freshly prepared, and the U. S. Pharmacopœia directs that the magnesia mixture and solution of iron always be kept in hand for that purpose. It is given in doses of a teaspoonful to a tablespoonful every fifteen to thirty minutes.

Pilulæ Aloes et Ferri.—Composed of one grain each of purified aloes, dried sulphate of iron, and aromatic powder, made up with confection of rose.

℞ Ferri sulph.,
Sacch. albi, ... āā ʒ iiss.
Potass. carb., ... gr. lxxv.
Magnesiæ,
Pulv. althææ, ... āā gr. viij.
Glycerini, ... q.s.
M. et ft. pil. No. 150. S. One to three pills three times a day.

℞ Ferri sulph.,
Potass. carb., ... āā ℥ ss.
Tragacanthæ, ... ʒ ss.
M. et ft. pil. No. 100. Blaud's pills. Dose two, then three or four pills three times a day. (Chlorosis. When constipation is present powdered jalap and soap may be substituted for the tragacanth.)

℞ Ferri sulph. exsiccati, ... gr. xv.
Sodii bicarb., ... gr. xlv.
Sacch. albi, ... ʒ v.
M. et div. in chart. N. 10. S. One powder three times a day in a glass of sweetened water.

℞. Ferri sulph.,
Magnesii carb., ... āā ʒ iiss.
Pulv. glycyrrh.,
Ext. glycyrrh., ... āā q.s.
M. et ft. pil. No. 100. S. Two to four pills three times a day after meals. (Chlorosis.)

℞ Acidi tartarici, ... ʒ viij.
Sodii bicarb., ... ʒ vi.
Ferri sulph. exsic., ... gr. xviij.
Sacch. albi, ... ʒ xxvi.
M. bene, optime siccatos. S. One teaspoonful to a tablespoonful in water. (Chalybeate effervescent water.)

℞ Ferri sulph. exsic., ... gr. viij.
Pulv. aërophor., ... ʒ iiss.
M. et div. in chart. No. 10. S. One powder in a glass of water. (An artificial iron-water.)

FRANGULA.

Buckthorn bark is a laxative, of very tolerable taste, similar in its action to senna, but more suitable for long-continued use, which is especially recommended in hemorrhoids. If de-

sired, the patient himself can prepare, very cheaply, a decoction from two tablespoonfuls of the ground bark in two cupfuls of water to which may be added a little pomegranate, etc.

Take of:
Buckthorn bark, ... 6 drachms.
Boil in ordinary water, q.s.,
Strain, and evaporate down to . . 6 drachms.
Add
Alcohol, ... 5 drachms.
Dose: one teaspoonful in a glass of sweetened water at night. (A pleasant laxative.)

℞ Sodii sulphatis, ... 3 v.
Decoct. frangulæ (frangul., 3 vi.), . . ℥ v.
M. S. A wineglassful morning and evening. (Chronic constipation.)

FUCHSINUM.

Internally recommended in doses of gr. ss., gradually increased to gr. iv. (gr. viij. pro die) in powder, pill, or mixture, several times a day, in nephritis and albuminuria. (Care must be taken that the drug is not contaminated with arsenic.)

℞ Fuchsini puri, ... gr. xv.
Sacch. albi, ... 3 i.
M. et div. in chart. No. 10. S. Two to four powders a day.

FUCUS CRISPUS.

See Cetraria.

FUNGUS CHIRURGICORUM.

Surgeon's agaric, Polyporus fomentarius (not impregnated with saltpetre), is employed externally to arrest bleeding.

FUNGUS LARICIS.

See Agaricus Albus.

GALLA.

Nut-gall is an astringent like tannin. The crude drug is seldom used, or at most in infusion or decoction (5 to 15 parts in 100) as a mouth-wash, gargle, or enema.

Tinctura Gallæ.—*Internally* employed in doses of ʒ ss.–ij., several times a day, as an astringent in hemorrhage from the lungs or kidneys, chronic cystitis, diarrhœa, etc.

Externally applied, pure or diluted, in epulis, stomatitis, tonsillitis, etc. Mixed with tincture of iodine, equal parts, it is used for painting frost-bites.

GAMBOGIA.

See Cambogia.

GELSEMIUM.

The root of Gelsemium sempervirens, yellow jasmine, is a narcotic sedative in doses of gr. iv. (gr. xv. pro die). It should be prescribed with caution, since, as in the case of morphine and cocaine, a habit is easily acquired which it is difficult to overcome.

Extractum Gelsemii Fluidum.—(Is poisonous in doses of gtt. viij.–xxx.) Internally employed in doses of ♏ ½ to vi. several times a day in the treatment of trigeminal neuralgia, toothache, and also pruritus, and eczema attended with much itching. It has likewise been employed, like veratrum, in fevers, and irritable bladder and difficult micturition.

Tinctura Gelsemii.—Internally used in doses of gtt. v.–xxx., sometimes combined with equal parts of tincture of colchicum, three or four times a day in trigeminal neuralgia, pruritic eczema, etc. Care must be used, as the strength of the preparation is liable to variation.

GENTIANA.

A pure bitter. Employed in dyspepia in aqueous or vinous infusion (3 to 10 parts in 100), decoction, or powder, as a stomachic.

Pieces of the dry root, cut to a proper size and shape, and smoothed, may be used like laminaria to dilate the cervical canal, as they swell when moistened. In order to remove the yellow coloring matter they may be first soaked in water, and then dried again before using.

Extractum Gentianæ.—Employed in doses of gr. v.–xxx. several times a day in pills or mixture.

Tinctura Gentianæ.—(One part to 5 parts diluted alcohol.) Dose: 20 to 60 drops or more several times a day.

Tinctura Gentianæ Composita.—Composed of gentian, 8 parts; bitter orange peel, 4 parts; cardamom, 2 parts; diluted alcohol sufficient to make 100 parts. Dose: ʒ i.–ij.

Tinctura Amara.—Composed of 3 parts each of gentian and centaury, 2 parts bitter orange peel, and 1 part each unripe orange and zedoary, in 50 parts of diluted alcohol.

Internally employed in doses of one-half to one teaspoonful several times a day.

GLONOINUM.

See Nitroglycerinum.

GLYCERINUM.

Soluble in all proportions in water and alcohol, but insoluble in ether, chloroform, and the fixed oils.

Internally employed in trichinosis (after active catharsis by means of the compound infusion of senna) in doses of a tablespoonful every hour, to the amount of ℥ v.–vij. of pure glycerin in the day. At the same time high rectal injections should be given, first of pure water and then of equal parts of glycerin and water. Conjoined with this large doses of brandy or other alcoholic preparation should be taken.

The use of glycerin in laryngeal and other forms of catarrh, digestive disorders, tuberculosis, and diabetes mellitus has not met the expectations of its advocates.

Externally used as a protective, non-drying, application in scaly eczema, gangrenous ulcers, and small-pox pustules (diluted with 2 parts of water); in the form of ear-drops, especially in deafness dependent upon dryness of the external auditory canal, etc.

A wash of equal parts of glycerin and lactic acid is employed in prickly heat. (See formula below.)

It is used in the preparation of many fluid extracts, and is a good permanent solvent of extracts, alkaloids, tannin, and the soluble metallic salts.

Employed in enema (ʒ ss.–i.) or better, in suppositories, in simple constipation, especially when associated with gastric disturbances; it causes an evacuation of the bowels within fifteen to twenty minutes.

Unguentum Glycerini.—Prepared by mixing 10 parts of starch, 15 of water, 100 of glycerin, 2 of tragacanth, and 5 of

alcohol. Is used as a constituent for many salves, but is less readily absorbed through the skin than lard, or especially lanolin; also employed alone as an application to eczema and other skin affections and to variolous pustules.

Glyceritum Vitelli.—Glyconin, or glycerite of yolk of egg, is made of 55 parts glycerin and 45 parts fresh yolk of egg (10 parts of laudanum may be added if desired). It forms an easily removable protective in burns, erysipelas, sore nipples, and various cutaneous affections.

℞ Sodii boratis, ... ʒ i.
Ung. glycerini, ... ʒ v.
Aq. rosæ, ... ʒ ss.
Ol. rosæ, ... gtt. i.
Alcoholis absoluti, ... gtt. xv.
M. S. Glycerite of rose water. (Sore nipples, frost-bites, excoriations, etc.)

℞ Ammonii chloridi, ... ʒ i.
Aq. destillatæ, ... ʒ x.
Glycerini, ... ʒ v.
Aq. amygdal. amaræ, ... ʒ ij.
M. S. One teaspoonful every hour, in acute catarrh of the larynx and pharynx.

℞ Acidi tannici, ... ʒ i.
Glycerini, ... ʒ iv.
M. S. To be applied on tampons in acute and chronic vaginitis.

℞ Ammonii chloridi, ... ʒ i.
Acidi hydrochlor., ... ♏ lxxv.
Glycerini, ... ℥ i.
Tinct. benzoini, ... ʒ iiss.
Aq. rosæ, ... ℥ iij.
M. S. To be applied morning and evening with a brush to prickly heat.

℞ Zinci oxidi,
Acidi tannici, ... āā gr. xv.
Glycerini, ... ℥ ss.
M. et adde
Tinct. benzoini, ... ʒ ss.
Camphoræ, ... gr. xv.
M. S. Liniment for parts deprived of the epidermis.

GLYCYRRHIZA.

Contains grape sugar and is reputed to be an excellent remedy to "cut the phlegm" in bronchitis.

Internally employed, without any fixed dose, in infusion (℥ iiss.–v. in ℥ vi.), powder, or as a tea in the

Species Pectorales.—Composed of, iris, 1 part; tussilago (farfaris), 4 parts; verbascum and anise-seed, each 2 parts; licorice-root, 3 parts; and althæa, 8 parts.

Extractum Glycyrrhizæ.—Employed as a constituent of pills and mixtures; dose gr. xv.–xxx.

Syrupus Glycyrrhizæ.—Frequently employed as an adjuvant and to disguise the taste of many bad-tasting remedies.

Pulvis Glycyrrhizæ Compositus.—A laxative and expectorant. Composed of senna, 18 parts; fennel-seed, 8; washed sulphur, 8; licorice, 16; and sugar, 50 parts. For children as much as can be taken on the tip of a knife-blade, and for adults one-half to one teaspoonful, as a mild laxative, especially in hemorrhoids.

Elixir Glycyrrhizæ.—Extract of licorice, solution of anisated ammonia, each 10 parts; fennel water, 30 parts. Given in doses of 20 to 30 drops, pure or in water, several times a day (also with laudanum added) as an expectorant in irritable cough.

GOA PULVIS.

A powder obtained from cavities in the wood of Andira araroba, containing Chrysarobin (*q.v.*), and like it employed externally in the treatment of cutaneous parasites, various skin diseases, etc.

℞ Pulv. Goa, ... ℥ iv.
Paraffin. liq., ... ℥ ij.
Acidi acetici, ... ℥ ij.
M. S. To be rubbed on the skin twice a day after a bath with soap and water.

℞ Pulv. Goa, ... ℥ i.
Collodii flexilis, ... ℥ v.
M. S. To be applied with a brush in psoriasis circumscripta.

GOSSYPII RADICIS CORTEX.

Abortifacient and hæmostatic, similar to ergot. It may be given in powder in doses of gr. iij.–viij., in decoction (ten per cent) or better under the form of

Extractum Gossypii Fluidum.—*Internally* employed in doses of ♏ xv.–lxxv. (℥ ss. pro die) from one to three times a day in metrorrhagia. It produces uterine contractions.

GOSSYPIUM HÆMOSTATICUM.

See under Ferri Chloridum.

GRANATUM.

An anthelmintic, employed in the treatment of tape-worm, but is inferior to brayera (kooso). The fresh bark is more active than the dry. (For the preliminary dietetic treatment see Brayera.) It is taken in the morning in decoction according to the formula and directions given below.

Pelletierinæ Sulphas.—The sulphate of an alkaloid derived from pomegranate bark.

Internally employed to the amount of gr. v.–viij., or more if caution be used, in divided doses during one hour, in syrup or wafers. The treatment before and after should be the same as when brayera is given. Vertigo, vomiting, and other toxic symptoms may be produced in the case of children or debilitated adults.

Pelletierinæ Tannas.—Employed like the sulphate, but in about double the dose.

Take of:

Powdered pomegranate, . .	6 to 12 drachms.

macerate for twelve hours in

Distilled water, ...	½ pint.

then boil down to, ... 6 ounces.

and add

Syrup of ginger, . . .	12 drachms.

To be taken in the course of one hour, and followed immediately by a dose of castor oil. (It not infrequently causes nausea and vomiting.)

GRINDELIA.

The leaves and flowering tops of Grindelia robusta. Employed to make the following·

Extractum Grindeliæ Fluidum.—*Internally* employed in doses of 20 to 40 drops or more, in water, for the relief of obstinate asthma.

℞ Ext. grindeliæ fl., ... ℥ ss.
Potassii iodidi, ... ʒ iiss.
Syr. aurant. cort., ... ʒ v.
Aq. destillatæ, ... ℥ iiss.
M. S. One teaspoonful three times a day.

GUAIACUM.

Internally employed in decoction of ʒ i. to a pint of water, taken through the day. Is also used as a constituent of anti-syphilitic teas (Species lignorum).

Externally its chief application is in the preparation of aromatic astringent tooth-washes.

Resina Guaiaci.—Employed in doses of gr. v.–xv. three or four times a day in powder, electuary, pill, or emulsion. It is employed as a diuretc and diaphoretic, for steady use, in inveterate forms of syphilis, gout, rheumatism, obstinate skin eruptions, lupus, and dropsy. Its action is similar to that of sarsaparilla. It is not well borne when there is a tendency to congestion.

Tinctura Guaiaci.—Given in doses of 20 to 60 minims several times a day.

Species Lignorum.—Composed of 5 parts of guaiac, 3 of lappa root, and 1 each of sassafras and licorice. Two tablespoonfuls are added to 6 glasses of water and boiled down to 4; and of this the half is taken warm in bed in the morning, the rest cold at night, in order to obtain a diuretic effect. If a cathartic action is desired, about $\frac{1}{6}$ part of senna leaves is added.

Take of:
Guaiac wood coarsely scraped, . . 1 ounce.
boil in sufficient water down to, . . 6 ounces;
just before the end of the boiling add
Senna leaves, ... 1 drachm.
Licorice root, ... 2 drachms.
Fennel seed, ... 1 drachm.
Strain, and consume in the course of one day.

℞ Resin. guaiaci,
Pulv. rhei,
Aloes, ... āā 3 i.
Extr. colocynth., ... gr. x.
M. et ft. pil. No. 100. S. Three pills in the morning.

GUAIACOLUM.

See Creasotum.

GUARANA.

A dried paste of the crushed seeds of Paullinia sorbilis. Contains, besides tannic acid, gum, and a fixed oil, about five per cent caffeine. A nervine and astringent.

Internally employed in doses of gr. viij.–xl. in powder, several times a day, for hemicrania; it is also used for diarrhœa in children.

Extractum Guaranæ Fluidum.—May be used instead of the powder in doses of 8 to 40 drops.

℞ Guaranæ, ... 3 i.
(Quin. hydrochlor., ... gr. xij.)
(Morph. hydrochlor., ... gr. ½)
Div. in chart. No. 4. At the beginning of a hemicrania take one powder, and then a second at the end of from one to three hours, or more if necessary.

℞ Guaranæ,
Sacch. albi, ... āā gr. xl.
M. et div. in chart. No. 5. S. To be taken in the course of twenty-four hours. (Diarrhœa, chronic intestinal catarrh, dyspepsia.)

HAMAMELIS.

The root and leaves of Hamamelis virginica (witch hazel). The crude drug is not employed in medicine, but is used to make the following:

Extractum Hamamelis Fluidum.—A tonic and astringent.

Internally in doses of one to two teaspoonfuls several times a day in hemorrhages of all kinds; in hæmoptysis in doses of 20 to 40 drops several times a day; in diarrhœa and in blennorrhœa.

Externally, mixed with equal parts of glycerin and a little starch, as an application to bleeding piles; also employed in skin diseases, especially eczema and pruritus, and in cutaneous inflammations.

HELENINUM.

Antiseptic.—A colorless and odorless crystalline substance, derived from Inula (elecampane), insoluble in water but readily soluble in hot alcohol, ether, and fixed oils.

Internally employed in doses of gr. $\frac{1}{6}$ to v. several times a day (gr. xv. pro die) in powder or alcoholic solution, in malaria, but more especially recommended in tuberculosis, whooping-cough, chronic bronchitis, and catarrhal diarrhœa.

Externally applied to foul ulcers as an antiseptic.

Alantolum.—*Internally* employed in the same way, and to meet the same indications, as helenin, but sufficient data are wanting to establish its value.

HOMATROPINA.

See Belladonna.

HYDRARGYRUM.

The mercurials, which can only exert their systemic and resorbent effects by forming readily soluble albuminates in combination with the albumin of the organism, find their chief application in the treatment of syphilis; then in the destruction of micro-organisms, vegetable and animal parasites, here more especially the bichloride; further as purgatives and diuretics, calomel; and finally as antiphlogistics and resorbents in inflammatory affections of various sorts and of various organs. In regard to the last-named action their value is very questionable, and they are but seldom used at the present time. Also in regard to external applications (blue ointment) to effect the resorption of already formed, but not suppurating, inflammations (lymphangitis) and exudations, the therapeutic field of mercury has become very restricted.

On the other hand, as regards the treatment of syphilis, mercury was formerly, and in a measure still is, regarded almost as a specific. The action of the drug in the different forms of this disease may be formulated as follows:

The simple, milder forms of syphilis (roseola, condylomata,

etc.) may be treated without mercury, but they disappear much more quickly and permanently when the drug is employed. Mercury can certainly cause the primary lesion (indurated chancre) to disappear, still secondary symptoms often enough follow, and many experienced syphilographers therefore recommend that the remedy be not used for hard chancre, in order to save the organism the debilitating effects of repeated mercurialization. Nevertheless, a hard chancre can be quickly cured, and the induration dissipated, by the application of gray ointment.

In the tertiary forms mercury is less efficient than iodine, but it is nevertheless urgently indicated when speedy help is demanded in the case of syphilitic disease of an important organ; as in iritis, severe forms of laryngeal syphilis, cerebral troubles, etc. Very often in especially severe cases, the threatening symptoms, which have persisted in spite of the most active non-mercurial treatment, will rapidly disappear under mercurialization. Furthermore, many observers state that the tertiary symptoms disappear less rapidly under mercury than under iodine, but for that reason more certainly and more permanently.

The mercurial treatment of syphilis is either not to be attempted at all or to be employed with great caution in cases of serious digestive disturbances, marked anæmia or (non-syphilitic) cachexia, scrofula, tuberculosis, or scorbutic affection; and care must be used in its application in cases of chronic alcoholism, in pregnancy, and finally when gangrenous ulceration, or ulceration that threatens to become gangrenous, is present.

General Considerations Concerning the Employment of Mercury in Syphilis.

For *internal* use those preparations are to be preferred which may be the longest continued without injury to the digestive organs. This is more particularly the case with those preparations which must be converted into assimilable forms in the stomach and intestinal canal than with those which are already in shape to be absorbed before administration.

For *external* application the preferable modes are inunctions, sublimate baths, and subcutaneous injections (bichloride, albuminate, peptonate, and calomel), then vaporization and

suppositories (blue ointment); the last-named methods find their special application in cases of extensive exanthemata and where the condition of the stomach and intestinal tract forbids the internal administration of mercury.

The mercurial treatment should be continued not only until all the symptoms have completely disappeared, but also for a certain time after. Ricord used to require every syphilitic patient to take iodide of mercury for six months and iodide of potassium also for six months. Other syphilographers interrupt the treatment repeatedly for one month in every three or four, and then begin again.

Cautions.—In all forms of mercurial treatment the greatest attention must be paid to keeping the buccal cavity clean, and on the first appearance of stomatitis the mercury must be stopped, and a mouth wash of chlorate of potassium, or some other astringent solution, must be used. A still safer method, when inunction is being practised, is to use a mouth wash of this kind during the entire course of treatment.

Salivation, as is well known, is more apt to occur in those who live in small and badly ventilated rooms, from inhalation of the fumes of mercury when inunctions are practised, when constipation is present, if the care of the skin is neglected, and after taking cold.

The diet during a course of mercurialization should be ample and nutritious; vegetables which cause flatulence, fruit, and all foods containing vegetable acids should be avoided. Beverages containing soda are also to be avoided. The use of milk is to be recommended. For weak persons a little beer or wine is allowable, but tobacco must be forbidden.

Mercurial poisoning of mild degree passes away under the treatment above indicated. Severe acute poisoning calls for the use of the stomach-pump or an emetic (apomorphine) to empty the stomach, and the exhibition of freshly precipitated sulphide of iron as an antidote; also milk in abundance, albumen, cathartics, opiates, and stimulants. For chronic poisoning, the prophylactic measures above mentioned, a good nutritious diet, fresh pure air, warm (sulphur) baths, and iodide of potassium.

PREPARATIONS OF MERCURY.

HYDRARGYRUM.

Internally exhibited metallic mercury is not absorbed, and is therefore never given to produce a systemic effect, but only occasionally as a mechanical help in desperate cases of intestinal occlusion, from three to ten ounces, or even one or two pounds, being swallowed for this purpose. It is to be avoided, when peritonitis or hernia is present, and its results are always problematical.

Unguentum Hydrargyri.—The recently introduced mollinum (*q.v.*) has been recommended as an excellent excipient for this ointment in place of lard.

Externally employed by friction and in plasters:

1. To obtain local effects. A piece the size of a small bean may be applied several times a day in cases of glandular inflammation, mastitis, parotitis (with care); from ½ to 1 drachm rubbed on the skin from four to six times a day in croup and inflammatory processes such as pneumonia, pleurisy, and peritonitis; in felon, orchitis, pseudo-erysipelas; in variola to abort the pustules; in furuncles and carbuncle, a cloth spread with the ointment is applied over the phlegmon and left there, while the skin around it is rubbed every two hours with a piece the size of a pea.

To promote resorption and dissipation of exudative products without pus-formation in inflammations of all sorts, but is seldom so employed at the present time. (When the local applications in cases of iritis, epididymitis, etc., actually produce good results, it is allowable to assume a syphilitic foundation for the trouble.)

As a certain parasiticide, especially in phthiriasis capitis and vestimentorum.

As an adjuvant in the treatment of lupus.

(The action of the ointment is increased by the addition of corrosive sublimate—gr. i.–iss. in 3 vi.—red precipitate, iodine and iodide of potassium, turpentine, camphor, etc.; and weakened by the addition of other ointments, hyoscyamus, opium.)

2. To produce a systemic effect, the inunction method is especially valuable in secondary syphilis. The patient rubs on the skin (using a piece of leather or a glove) for from

fifteen to thirty minutes every day from 45 to 75 grains of blue ointment. This he does for eight days, selecting a new part of the body each day, thus: 1, the right leg; 2, the left leg; 3, right thigh; 4, left thigh; 5, right arm; 6, left arm; 7, chest; 8, abdomen. By means of a bath before the rubbing, or a sweat after, the absorptive power of the skin is increased. The part to which the ointment has been applied is protected by a flannel bandage. Before each application the body should be washed with soap and water, and throughout the course the greatest cleanliness, especially as regards the mouth, should be observed. After every meal the teeth should be carefully picked and brushed and a mouth-wash and gargle containing chlorate of potassium should be used. If the gums are already a little "touched," they should be painted about the roots of every tooth with tincture of myrrh applied with a fine brush. Then the mouth-wash is again to be used at bed-time. The food should be of the most nourishing kind, with a glass of beer or wine and plenty of milk. The bowels must be moved at least once a day, to effect which some mineral water may be given, if necessary. At each recurrence of the eruption (as well as in the first roseola) iodide of potassium is given, and the mercurial course repeated in the same way or perhaps rather less energetically. The best time of the year for the inunction treatment is the spring and summer. If it must be undertaken in the winter care must be taken by the patient after the "cure" is over, not to expose himself to the raw air, and he had better remain in bed.

Contra-indications to the inunction treatment are to be found only in general acute eczema and large cutaneous wounds.

Emplastrum Hydrargyri.— Contains 30 parts of mercury, 10 each of olive oil and resin, and 50 of lead plaster. Its effects are best seen in the case of the initial lesion and in cutaneous ulcers and gummata of the periosteum.

Oleum Cinereum.—Composed of 3 parts each of mercury and lanolin and 4 parts of olive oil. Employed subcutaneously in doses of gr. iv. once a week as a mild syphilis "cure."

Sapo Mercurialis.—Composed of $33\frac{1}{3}$ grains of mercury and $66\frac{2}{3}$ grains of potash soap. It is recommended as a substitute for mercurial ointment, as being cleaner and more easily rubbed in, but otherwise has no special advantage.

Massa Hydrargyri.—Blue pill contains 33 parts of mercury, 5 of licorice, 3 of glycerin, 25 of althæa, and 34 of honey of rose. It is given in doses of gr. i.–xv.

HYDRARGYRUM AMMONIATUM.

White precipitate is employed only externally, and resembles in action the red precipitate, but is preferred to the latter in parasitic and other diseases of the skin, in eczema, and in eye-diseases, applied in the form of the officinal ointment.

Unguentum Hydrargyri Ammoniati.—Contains ten per cent of ammoniated mercury.

℞ Ung. hydrarg. ammon., ... ʒ i.
Ung. paraffini, ... ʒ iij.
M. S. To be rubbed over small areas in tinea capitis, the parts being first thoroughly cleansed.

℞ Hydrarg. ammon.,
Bismuthi subnitr., ... āā ʒ i.
Ung. glycerini, ... ʒ iv.
M. S. To be applied every two or three days. (Psoriasis, pigmented spots on the skin, prickly heat, chloasma hepaticum, etc.)

HYDRARGYRUM CARBONICUM OXIDATUM.

Internally employed in doses of gr. $\frac{1}{8}$ in pill, beginning with one pill a day and gradually increasing to six pills.

HYDRARGYRI CHLORIDUM CORROSIVUM.

Corrosive sublimate, bichloride of mercury, occurs in the form of white, translucent, crystalline pieces, which may be made into a white powder by rubbing, and on the application of heat melts and becomes volatilized. It is soluble in 16 parts of cold, and 3 of boiling, water, 3 of alcohol, and 4 of ether.

Internally employed in doses of $\frac{1}{12}$ to the maximum of gr. $\frac{1}{3}$, in pills with argilla (not more than $\frac{1}{12}$ grain to the pill) once or twice a day after meals, in syphilis.

Subcutaneously an injection may be given every day or every other day of a one-half to one per cent aqueous solution, but the albuminate or peptonate is preferable.

Externally employed in weak solution, 1 grain to the quart,

as an injection in gonorrhœa; for the vagina a 1:2,000 solution may be used; for washing out the conjunctival sac a solution of gr. iij.–v. to the quart is strong enough. Used as a gargle and by inhalation (1:1,000) in sore-throat and laryngitis, but especially in diphtheria (gr. i.–iij. in ʒ vij. for children one to twelve years old) for gargle, gentle pencilling, and inhalations once in about every three hours. Employed also in baths in skin diseases, and as a caustic (see Collodium).

For lotions, mouth washes, and sprays, 1 part in 100 of a 1:1,000 solution is used, or the same proportion of a solution of 1 part each of corrosive sublimate and common salt (and 5 parts of tartaric acid) in 1,000 of ordinary water. The addition of the chloride of sodium prevents the precipitation of the bichloride in undistilled water and does not weaken the solution for disinfectant and surgical purposes; the tartaric acid is said to render the solution less irritating and more certain. In obstetrical practice a solution of 1:2,000 is employed as a disinfectant to the external genitals and vagina; for washing out the puerperal uterus a solution of 1:5,000 is strong enough, and care must be taken that it all flows away readily and is not retained in the uterus. Towels and tampons should be dipped in a 1:1,000 solution and then dried. For impregnating cotton, gauze, wood-wool, moss, etc., a solution is made of 5 parts of corrosive sublimate (5 of chloride of sodium), 250 of glycerin, 500 of alcohol, and 750 of distilled water, with perhaps one-third of a grain of fuchsin to the pint if it is desired to give it a special distinguishing color. Three pints of this solution will suffice for about forty-five yards of mull or a proportionate weight of cotton. Catgut, silk, drains, and sponges are kept in a 5-per-mil. solution of sublimate for ten to twelve hours; and before being used are laid in a 1:1,000 sublimate, or three-per-cent carbolic acid solution; the instruments also are placed in the carbolic solution. The hands are washed with alkaline soap, then with alcohol, and finally dipped into a 1:1,000 sublimate solution.

Lotio Flava.—Yellow wash is made by adding 30 grains of corrosive sublimate to the pint of lime water; it is applied (after shaking the bottle) to dressings for syphilitic ulcers, etc.

Hydrargyri Bichloridum Albuminatum.—To diluted and carefully filtered white of egg a solution of corrosive sublimate (5:1,000) is added in such proportion that all the albu-

minate of mercury is held in solution. This preparation and also the Hydrargyri Bichloridum Peptonatum are used both internally and subcutaneously (gr. $\frac{1}{12}$ to $\frac{1}{6}$), and for the latter purpose are better than the simple watery solution.

Liquor Hydrargyri Bichloridi Carbamidati.—Prepared by dissolving 15 grains of corrosive sublimate in 3½ ounces of hot water containing 8 grains of urea (♏ xv. represent gr. $\frac{1}{6}$ of the bichloride.) It is recommended as a mild preparation, especially adapted for painless hypodermic use, in the treatment of syphilis.

Unguentum Acre.—Composed of bichloride of mercury, cantharides, and solution of chloride of antimony, each 1 part, and resin cerate, 4 parts.

℞ Hydrarg. chlor. corros., . . . gr. iss.–iij.
Aq. destillatæ, ... ℥ viss.
M. S. For inhalation, in angina, syphilitic pharyngitis, and diphtheria.

℞ Hydrarg. chlor. corros., ... gr. i.
Argillæ, ... gr. xlv.
Aq. destillatæ, ... q.s.
M. et ft. pil. No. 30. S. One pill morning and night, gradually increased.

℞ Hydrarg. chlor. corros., ... gr. iss.
Sodii chloridi, ... gr. viij.
Aq. destillatæ, ... ʒ iiss.
M. solv. terendo, filtr. S. For subcutaneous injection in dose of ♏ viij. in the back or buttocks, gradually increasing to ♏ xv.

℞ Hydrarg. chlor. corros., . . . gr. viij.–xv.
Solve in
Ætheris, ... ʒ i.
Adde
Collodii, ... ʒ v.
M. S. Sublimate collodion. (As a caustic for pigmented spots, birth-marks, etc.)

℞ Hydrarg. chlor. corros., ... gr. iss.
Sodii chloridi, ... gr. v.–xv.
Aq. destillatæ, ... ʒ iiss.
M. S. For hypodermic use, in dose of ♏ xv. every second day.

℞ Hydrarg. chlor. corros., ... gr. iss.–iij.
Tinct. benzoini, ... ʒ iiss.
Aq. rosæ, ... ℥ vi.

M. S. Lotion for use in acne rosacea and disseminata, and in prickly heat.

℞ Hydrarg. chlor. corros., ... gr. vij.
Glycerini, ... ʒ vi.

M. S. For touching syphilitic ulcers in the mouth and throat.

℞ Hydrarg. chlor. corros., ... ʒ i.
Sodii chloridi, ... ʒ ij.
Acidi tartarici, ... ʒ v.
Aq. destillatæ, ... ℥ iiss.

M. Keep in a yellow-glass bottle and label Poison. S. Five-per-cent sublimate solution for use in making solutions. (Twenty drops contain 1 grain of the bichloride.)

℞ Hydrarg. chlor. corros., ... gr. xv.
Solut. peptonat. aq., ... ʒ xiiss.
Sodii chloridi, ... gr. xlv.

M. et ft. solutio et filtra. S. For hypodermic use. (In every 15 drops of the solution there is ⅓ grain of bichloride.)

HYDRARGYRI CHLORIDUM MITE.

Calomel occurs in the form of an impalpable powder, and for this reason is preferred for use in the eyes.

Internally employed best as a powder mixed with sugar in wafers; and during its use salty food and the medicinal employment of chlorine water should be avoided.

1. As a laxative in doses of gr. iij.–xv. for adults, gr. ⅙ to iss. for children, often combined with jalap or rhubarb.

2. In typhoid fever, up to about the ninth day, in strong individuals, when there is considerable fever and not much intestinal disturbance, it has been given in doses of gr. vij. from two to four times in the twenty-four hours; but this is now abandoned by many.

3. In summer diarrhœa of children and cholera infantum, due to digestive disturbances, calomel is given in small repeated doses of about $\frac{1}{12}$ to ⅓ grain. In cholera (gr. $\frac{1}{12}$ to ⅙) the action of the drug is very uncertain.

4. In syphilis, especially in small children, where the remedy must be used for an extended period, it may be given in doses of gr. $\frac{1}{6}$ to iss. three times a day. In adults, but not in children, $\frac{1}{12}$ gr. opium may be added.

5. As a diuretic in œdema and dropsy of heart disease, also of cirrhosis of the liver, in doses of gr. iij. three times a day for three or four days, combined, if desired, with gr. $\frac{1}{6}$ opium or also with digitalis. If the desired result is not obtained, the treatment may be repeated in a week, and if it then fails the remedy may be abandoned. In exudative processes (pleurisy and the like) the diuretic action of calomel is ordinarily unsatisfactory or *nil.*

Externally.—(*a*) Applied once a day, pure or mixed with equal parts of sugar and $\frac{1}{5}$ part of powdered opium, in opacities of the cornea, scrofulous ophthalmia, and herpes of the cornea, during the use of which iodine in any form is to be avoided, to prevent the formation of a caustic iodide of mercury; and also in syphilitic ulcers and growths of the larynx and pharynx, and upon sluggish ulcers.

(*b*) Broad condylomata, dusted with calomel, after being previously painted with a solution of chloride of sodium, are quickly resorbed.

(*c*) For parenchymatous injection in syphilis. For the cure of a moderately severe syphilis 6 grains of calomel in four injections usually suffice; they are to be made in single doses of gr. i.–iss. thrown deeply into the gluteal region in the muscular tissue or the loose connective-tissue layer just above the fascia, alternately in the two sides at intervals of one or two weeks. The parts should be gently massaged after each injection. The syringe should be provided with a strong, gold-plated needle with wide lumen, made thoroughly aseptic with carbolic acid. A solution made according to the formula given below, or the strongly recommended calomel oil (ten per cent), may be used. Special care of the mouth is necessary.

Lotio Nigra.—Black wash is made by adding 30 grains of calomel to 10 ounces of lime water. It is used as an application to syphilitic ulcers.

[The use of calomel which has long been mixed with sugar or carbonate of magnesium should be avoided, as it is thereby transformed into corrosive sublimate.]

℞ Hydr. chlor. mitis, ... 3 i.
Sodii chloridi, ... gr. xv.
Aq. destillatæ, ... 3 x.

M. S. For parenchymatous injections into the gluteal region, in dose of ♏ viij.–xv.

℞ Hydrarg. chlor. mitis, ... gr. i.–ij.
Sacch. lactis, ... 3 i.

M. et div. in chart. No. 10. S. One powder every three hours. (Summer diarrhœa and cholera infantum.)

℞ Hydrarg. chlor. mitis, . . . gr. ix.–xxij.
Pulv. opii, ... gr. ix.
Sacch. albi, ... ℥ ss.

M. et div. in chart. No. 30. S. One powder morning and evening. (Syphilis in adults. For children each dose of calomel should be $\frac{1}{30}$ to $\frac{1}{6}$ gr., and no opium should be given.)

℞ Hydrarg. chor. mitis, . . . gr. i.–ix.
(Pulv. jalapæ, ... gr. xviij.–xxx.)
Sacch. albi, ... 3 i.

M. et div. in chart. No. 6. S. One powder every two hours. (Laxative for children.)

℞ Hydrarg. chlor. mitis, . . . 3 ss.
(Pulv. digitalis, ... gr. v.–viij.)
Sacch. albi, ... 3 i.

M. et div. in chart. No. 10. S. One powder three or four times a day for three or four days. (Diuretic in cardiac dropsy.)

℞ Hydrarg. chlor. mitis, ... gr. xv.
Pulv. opii, ... gr. v.
Ext. glycyrrh., ... q s.

M. et ft. pil. No. 20. S. One pill morning and evening until all the syphilitic symptoms have entirely disappeared.

HYDRARGYRI CYANIDUM.

Internally employed in doses of gr. $\frac{1}{12}$ to $\frac{1}{4}$ (maximum dose, gr. $\frac{1}{3}$, or gr. $1\frac{1}{2}$ pro die), in aqueous solution, pill, or powder, more especially in diphtheria occurring in older children. Its action here is questionable, but it has been recently recommended.

Externally in solution of 1 or 2 parts to a thousand as a

gargle in diphtheria and syphilitic ulcers of the throat, and on dressings.

Subcutaneously injected in dose of gr. $\frac{1}{12}$, it is said to be as effective as corrosive sublimate and never to cause salivation—but this is questionable.

℞ Hydrarg. cyanidi, ... gr. iij.
Aq. menth. pip., ... ʒ xij.
Aq. destillatæ, ... ℥ iiiss.
M. S. One teaspoonful every hour, day and night.

HYDRARGYRUM FORMAMIDATUM.

Externally recommended as an application to the initial lesion of syphilis in solution of $2\frac{1}{2}$ parts to a thousand.

Subcutaneous injections of ♏ viij.–xv. of a one-per-cent aqueous solution (corresponding to gr. $\frac{1}{12}$ to $\frac{1}{6}$ of corrosive sublimate), once a day for thirty days, are especially recommended in syphilis, as the preparation does not coagulate albumin, is quickly taken up into the circulation, and is excreted by the kidneys, and furthermore causes little local irritation.

HYDRARGYRI IODIDUM RUBRUM.

Biniodide of mercury is a scarlet-red powder, soluble in 130 parts of cold, and 20 of boiling, alcohol, but insoluble in water.

Internally employed in doses of $\frac{1}{12}$ to $\frac{1}{3}$ (the maximum), often with the addition of iodide of potassium, in alcoholic solution or pills, in inveterate forms of syphilis and scrofula, in lupus, etc. It should not be given with sulphur or chlorine salts or with bases.

Externally applied in the form of ointment (gr. i.–x. in gr. c. of lard) to scrofulous, syphilitic, and carcinomatous ulcers; and in solution (gr. iv.–ʒ xiiss. of water, with ʒ ss. of iodide of potassium) on a brush to syphilitic ulcers of the soft palate and pharynx.

℞ Hydrarg. iodidi rubri, ... gr. iss.
Potass. iodidi, ... ʒ ss.
Aq. destillatæ,
Syr. simplicis, ... āā ʒ iis.
M. Keep in yellow glass bottle. S. Fifteen to 30 drops three times a day.

℞ Hydrarg. iod. rubri, ... gr. viij.
Pulv. althææ,
Sacch. albi, ... āā ʒ i.
Mucil. acaciæ, ... q.s.

M. et ft. pil. No. 100. S. One to three pills three times a day.

HYDRARGYRI IODIDUM VIRIDE.

Internally the protiodide of mercury is employed in doses of gr. $\frac{1}{6}$ to i. (maximum, gr. iij. pro die) in powder or pill, but is no better for syphilis than calomel or corrosive sublimate, since the action of the iodine can hardly be taken into account.

HYDRARGYRI OXIDUM FLAVUM.

Internally employed in doses of gr. $\frac{1}{12}$ to $\frac{1}{6}$ (maximum dose, gr. $\frac{1}{3}$, or gr. iss. pro die) once or twice a day in powder or pill.

Externally applied in powder or ointment in parasitic skin diseases. Its action is similar to that of corrosive sublimate, but less intense. It is employed in eye-salves.

HYDRARGYRI OXIDUM RUBRUM.

Employed like the preceding.

Unguentum Hydrargyri Oxidi Rubri.—Made with 1 part of red precipitate to 9 parts of ointment. Employed as an application to sluggish granulations where a strong irritant is indicated.

Unguentum Ophthalmicum.—Composed of one part red precipitate ointment to 9 parts of vaselin.

Employed in chronic blepharitis marginalis, vascular keratitis, and opacities of the cornea.

Unguentum Ophthalmicum Compositum.—This is stronger than the preceding, and is made after the following formula:

℞ Hydrarg. oxidi rubri, ... gr. xlv.
Zinci oxidi,
Camphoræ, ... āā gr. xv.
Ceræ flavæ, ... gr. lxxv.
Adipis, ... ʒ vi.

M. S. Unguentum Ophthalmicum Compositum.

HYDRARGYRI SALICYLAS.

Strongly recommended for intra-muscular injections, suspended in oil or liquid vaselin (1:10) in syphilis, in doses of gr. iss. every four days, or two injections of the same amount every eight days.

Thymolated mercury is employed in the same way and in the same dose as the salicylate.

HYDRARGYRI SOZOIODOLAS.

See Sozoiodolum.

HYDRARGYRI SULPHO-ICHTHYOLAS.

See Ichthyolum.

HYDRARGYRI TANNAS.

Internally employed in doses of gr. $\frac{1}{3}$ to $\frac{1}{2}$ for children, gr. iss.–iij. for adults, in powder with sugar of milk in three doses after meals. A mild, very slightly laxative antisyphilitic remedy. It may be given with tannin gr. i. or opium gr. $\frac{1}{3}$ when there is a tendency to diarrhœa.

℞ Hydrarg. tannat., ... gr. lxxv.
Pulv. glycyrrh.,
Ext. glycyrrh., ... āā q.s.
M. et ft. pil. No. 100. S. Two pills three times a day. (Secondary syphilis.)

℞ Hydrarg. tannatis, ... gr. xv.
Acidi tannici, ... ʒ i.
(Pulv. opii, ... gr. i.)
Sacch. lactis, ... ʒ i.
M. et div. in chart. No. 10. S. To be used when there is a tendency to diarrhœa.

HYDRASTIS.

A *hæmostatic*. The crude drug (rhizome of Hydrastis canadensis) is seldom used, but instead of it one of the following preparations.

Extractum Hydrastis Fluidum.—*Internally* employed in doses of 15 to 20 drops three or four times a day, pure in water, or in a mixture with Malaga wine and syrup of cinna-

mon, in too frequent or profuse menstruation at any time of life, but especially at puberty and the climacteric. In these cases and in uterine hemorrhage following endometritis it is almost always successful, but it is less certain in its effects in bleeding associated with uterine fibroids, in hæmoptysis, and epistaxis. Hydrastis does not produce uterine contractions, and for that reason it is less speedy in its effects than ergot, and it is therefore advisable to give the remedy, which also acts as a tonic and digestive, not only during the menstrual period, but also for several days before.

Extractum Hydrastis.—*Internally* employed less frequently than the preceding, in doses of about 12 grains a day, in pill form because of its unpleasant taste.

Tinctura Hydrastis.—*Internally* employed, like the fluid extract, in doses of 3 ss.–i. several times a day.

Hydrastinæ Hydrochloras.—*Internally* employed in doses of gr. ss.–iss. in powder or pill for the same purposes as the fluid extract of hydrastis, and also as a succedaneum for quinine in intermittent and typhoid fevers; in doses of gr. iss.–v. it is reputed to be a mild cholagogue laxative, useful in constipation associated with digestive disturbances and jaundice, but it is here an uncertain remedy.

Subcutaneously employed in doses of 15 drops of a ten-per-cent solution in water in uterine hemorrhage due to endometritis or fibroid tumors.

Berberinæ Sulphas.—This is another alkaloid extracted from hydrastis, which resembles hydrastine in dose, action, and indications.

℞ Hydrastinæ hydrochlor., ... gr. xv.
Solve in
Aq. destill. fervent., ... ʒiv.
Aq. aurant. flor.,
Syr. tolutan., ... āā ʒi.
M. S. Ten to 20 drops every two to four hours.

℞ Berberinæ sulph., ... gr. xv.
Solve in
Aq. dest. fervent., ... ʒv.
Adde
Vini malacensis,
Syr. cinnamomi, ... āā ʒi.
M. S. Fifteen to 25 drops every two to four hours.

HYDROQUINONUM.

An antipyretic and antizymotic.

Doses of 12 to 15 grains reduce the temperature about 1° F., but only for a very short period and with sweating, and frequently an equally rapid rise accompanied with a chill follows. Larger doses often cause vertigo, ringing in the ears, rapid respiration, and cardiac weakness. The remedy must, therefore, be used with caution.

Internally employed in doses of gr. iij.–xij., in solution, powder, or capsules, in all febrile conditions, acute rheumatism, pneumonia, typhoid fever, and tuberculosis. The internal use of the drug can, however, be dispensed with.

Subcutaneously it has been given in doses of 15 drops of a freshly-prepared ten-per-cent solution.

Externally used in one or two-per-cent solution as an injection in gonorrhœa, and on compresses in gonorrhœal ophthalmia; also applied in ointment, 1:30.

HYDROXYLAMINUM HYDROCHLORICUM.

Occurs in the form of colorless crystals soluble in water, alcohol, and glycerin.

Externally recommended in a solution of gr. iss. in ℥ xij. each of glycerin and alcohol in psoriasis, pityriasis versicolor, lupus, mycosis tonsurans, sycosis parasitaria, and other mycotic diseases of the skin, as a substitute for pyrogallic acid and chrysarobin. The diseased parts, previously washed with potash soap, are painted from three to five times a day with the above solution. (The remedy is extremely irritating to the skin when applied in stronger solutions; therefore care must be exercised in its use.)

HYOSCYAMUS.

Resembles belladonna in its action, and is, like it, employed for the relief of irritable cough and possibly neuralgia.

Internally given in doses of gr. ss.–v. (maximum dose, gr. viij., or gr. xxiv. pro die) several times a day in powder, pill, or infusion.

Externally in cataplasms, gargles, and enemas.

Extractum Hyoscyami.—*Internally* employed in doses of gr. $\frac{1}{4}$ up to the maximum of gr. iij., in pill, solution, tincture, or emulsion, as a quieting and antispasmodic remedy, more especially in diseases of the respiratory organs.

Externally used as a local application in toothache, in enemas or suppositories (gr. ss.–iij. each), as a collyrium (gr. viij.–xv. in ʒ vi.), an eye-salve (gr. viij.–xxx. in ʒ iiss. vaselin), in other ointments, and in plasters (ten to twenty-five per cent).

Extractum Hyoscyami Fluidum.—*Internally* employed like the preceding in doses of 5 drops.

Oleum Hyoscyami.—(Four parts of hyoscyamus, 3 parts alcohol, and 40 parts olive oil.)

Externally employed as an analgesic liniment, pure or mixed with equal parts of chloroform. Also given in enema in doses of 80 drops.

Unguentum Hyoscyami.—A ten-per-cent ointment employed externally for the same purposes as the oil.

Hyoscyamina.—Identical with duboisine, and similar in its action to atropine, though apparently somewhat more powerful.

Internally employed in doses of gr. $\frac{1}{64}$ to $\frac{1}{32}$ (gr. $\frac{1}{12}$ pro die) in powder or pill for neuralgia, paralysis agitans, chorea, and senile and mercurial tremor.

Externally applied in solution (gr. i. in ʒ vi. water with gtt. x. alcohol) in the eye as a mydriatic.

Subcutaneously in initial doses of gr. $\frac{1}{120}$, increased to $\frac{1}{60}$ if necessary, in maniacal conditions where morphine is not tolerated.

Hyoscinæ Hydrobromas.—*Hypnotic.*

Internally employed in doses of gr. $\frac{1}{600}$ to $\frac{1}{120}$ in powders, pills, or aqueous solution in spasmodic conditions and neuralgias of every kind, in chorea, paralysis agitans, epilepsy, and in excitable conditions and sleeplessness of the insane; also recommended in the night sweats of phthisis and spermatorrhœa. It is an exceedingly powerful poison, and must therefore be employed with great caution in very minute doses.

Subcutaneously employed to meet the same indications (see formula).

Hyoscinæ Hydrochloras; Hyoscinæ Hydriodas.—These two salts are similar in all respects to the hydrobromate of hyoscine.

℞ Extr. hyoscyami, ... gr. viij.
Solve in
Aq. destillatæ, ... ℥ v.
Vini antimonii, ... ʒ v.
Extr. glycyrrh., ... ʒ i.
M. S. One tablespoonful every two hours.

℞ Extr. hyoscyami, ... gr. xv.
Aq. amygdal. amaræ, ... ʒ v.
M. S. Ten to 20 drops in water or pectoral tea three or four times a day.

℞ Pulv. hyoscyami,
Ext. hyoscyami, ... āā gr. xxij.
M. et div. in pil. No. 30. S. One pill three times a day. (To quiet an irritable cough.)

℞ Antimonii pentasulphidi,
Extr. hyoscyami, ... āā gr. xl.
Pulv. glycyrrh., ... q.s.
M. et ft. pil. No. 50. S. One pill every two or three hours. (For a dry, irritable cough.)

℞ Hyoscinæ hydrochlor., ... gr. $\frac{1}{6}$
Aq. destillatæ, ... ʒ xviij.
Syr. aurant. cort., ... ʒ vij.
M. S. One teaspoonful once or twice a day. (Equivalent to gr. $\frac{1}{150}$.)

℞ Hyoscinæ hydrochlor., ... gr. $\frac{1}{6}$
Aq. destillatæ, ... ʒ iiss.
M. S. From 5 to 10 drops in water, milk, or wine; also by hypodermic injection in dose of gtt. iij.–vij. (containing gr. $\frac{1}{300}$ to $\frac{1}{120}$).

HYPNONUM.

Hypnone or acetophenone is a hypnotic remedy, obtained by distillation of a mixture of benzoate and acetate of calcium. It is a colorless, oily fluid, slightly caustic, and having a sharp taste and smell, only slightly soluble in water and glycerin, but readily so in the fixed oils.

Internally given in doses of 2 to 4 drops in gelatin capsules (each containing $\frac{1}{2}$ drop of hypnone in almond oil) it is said to produce a quiet, deep sleep in from one-half to three-

quarters of an hour. It is used in insomnia due to mental excitement, especially in hard drinkers, where it is reputed to surpass chloral and paraldehyde in efficacy. The hypnotic action is uncertain and there is no analgesic effect, yet the remedy is usually quieting. Care must be employed, as the remedy markedly lowers the excitability of the vagus, reduces the blood pressure, and alters the respiratory rhythm.

Subcutaneously it has been injected in solution in almond oil (1 part to 2). The remedy can be dispensed with.

JABORANDI.

See Pilocarpus.

ICHTHYOLUM.

A tarry substance, containing sulphur, of a disagreeable odor, obtained, near Seefeld in the Tyrol, by distillation from a bituminous schist containing the fossil remains of fishes. From it is obtained sulpho-ichthyolic acid, the foundation of the following most frequently used of the preparations of ichthyol.

Ammonii Sulpho-ichthyolas.—It is this preparation which is commonly called ichthyol. It is a reddish-brown, clear fluid of syrupy consistence, soluble in water and in a mixture of alcohol and ether, of an unpleasant bituminous odor, which is obtained by the neutralization of free sulpho-ichthyolic acid by stronger ammonia.

Hydrargyri Sulpho-ichthyolas.—Obtained by replacing the base in 10 parts of sulpho-ichthyolate of sodium with 3 parts of corrosive sublimate. Seldom used.

Lithii Sulpho-ichthyolas, Sodii Sulpho-ichthyolas, Zinci Sulpho-ichthyolas.—These three preparations are obtained by neutralizing free sulpho-ichthyolic acid with lithium carbonate, caustic soda, and oxide of zinc respectively.

Internally employed, especially the ammonium and lithium salts, in doses of gr. iv.–xv. in capsules or sugar-coated pills, in chronic rheumatism, and chronic catarrhal diseases of the stomach and lungs—here as a specific; in nephritis and dropsy, catarrhal cystitis, chronic gonorrhœa, Bright's disease, and diabetes; and also as an adjuvant in cases in which it is externally applied.

Externally employed in ointment (gr. xlv.–℥ i.) made with

vaselin, paraffin ointment, lanolin, or lard, in liniment with the addition of cumarin or vanillin to disguise the odor, in cotton, and in soap, in the treatment of acute and chronic articular rheumatism, neuralgias, sciatica, and lumbago; in peri- and para-metritic exudations; for frost-bites, burns, and varicose veins; in various skin diseases, such as psoriasis, eczema (especially of the hands), acne (red nose); and it has also been recently recommended in applications of two-per-cent strength in facial erysipelas.

Inhalations of a spray of sulpho-ichthyolate of ammonium ʒ iv.–v. in one or two quarts of water, once or twice a day, have been recommended in coryza, influenza, bronchial catarrhs attended with fever, and sore throat; but their value is questionable.

℞ Ammon. sulpho-ichthyol., ... ʒ iiss.
Ol. olivæ,
Liq. calcis, ... āā ℥ iij.

M. S. For application in eczema and other skin diseases. (Shake the bottle before using.)

℞ Ammon. sulpho-ichthyol., ... ʒ iiss.
Ol. ricini, ... ʒ v.
Alcohol., ... ℥ iij.

M. S. Mop the scalp with a sponge dipped in the solution twice a day, and then apply wadding. (For painful scalp in rheumatism.)

℞ Ammon. sulpho-ichthyol.,
Aquæ destillatæ, ... āā ʒ iiss.
Lanolini, ... ℥ i.

M. S. Apply twice a day to rheumatic joints (when painful) and cover with cotton.

℞ Ammon. sulpho-ichthyol.,
Ol. terebinthinæ, ... āā ℥ ss.

M. et ft. linimentum. S. To be applied in erysipelas and chilblains.

℞ Ammon. sulpho-ichthyol., ... ʒ i.
Adipis, ... ʒ iiss.
Lanolini, ... ℥ ss.

M. et ft. unguentum. S. For external use in prurigo, psoriasis, acne, and burns.

INFUSA.

The U. S. Pharmacopœia directs that infusions, the strength of which is not otherwise specified, shall be prepared by pouring 100 parts of boiling water upon 10 parts of the substance, coarsely comminuted, in a vessel provided with a cover; the vessel is then covered tightly and allowed to stand for two hours, after which the infusion is strained and enough water passed through the strainer to make the infusion weigh 100 parts. In the case of substances which are strong enough to have a fixed dose, the quantity to be used should be distinctly specified by the physician.

INGLUVINUM.

Recommended to meet the same indications and in the same dose as pepsin, which it resembles in action, but too little is yet known about it, and more experience in the use of the remedy is desirable.

INULA.

See Heleninum.

IODOFORMUM.

(Contains 96.7% iodine with carbon and hydrogen.) Lemon-yellow, shining scales, or a more or less fine crystalline powder, almost wholly insoluble in water, soluble in 50 parts of cold, and 10 parts of boiling, alcohol, in 5.2 parts of ether, and readily soluble in glycerin. It has a very penetrating saffron-like odor, which may be more or less well masked by cumarin (gr. i. in gr. xv. iodoform), equal parts of tonka bean, roasted coffee, balsam of Peru, oil of eucalyptus, or menthol in the proportion of gr. i. with 1 drop of oil of lavender to gr. xv. iodoform; to remove the odor from the hands and clothing spirit of lavender has been recommended. Many people, even physicians, are often attacked with acute exanthemata, eczema, or erythema, when brought in contact even in the slightest degree with iodoform, apparently due to an idiosyncrasy as regards iodine; in others the employment of iodoform, sometimes even in small amounts, but usually in rather large quantities of from 3 drachms to 3 ounces, causes genuine toxic symptoms, usually of a nervous character, such as headache, insomnia, mental disturbance from mere ill-humor up to actual

delirium, hallucinations of persecution, maniacal attacks, coma, etc. Care is therefore necessary in the use of iodoform in large quantities on extensive fresh wounds and wide areas of serous surfaces, in the aged more especially, and those suffering from heart disease; and carbolic acid should not be employed at the same time as iodoform. When symptoms of poisoning are present, all iodoform remaining in the wound should be carefully washed away with a weak solution of some of the alkaline carbonates (avoid oil), alkalies (bicarbonate of sodium, ʒvi.) given internally, and morphine hypodermically, if required.

Internally employed (but not at all advisable) in doses of gr. $\frac{1}{6}$ to $\frac{1}{3}$ (maximum dose, gr. iij., or gr. xv. pro die) several times a day in pill, powder, or ethereal solution, in neuralgia, diabetes, scrofulous affections, goitre, etc.

Externally used, it diminishes secretion, quiets pain, favors granulation, and acts as a deodorant. It is applied, pure or mixed with sugar, in powder to fresh wounds in order, under a permanent dressing, to keep them aseptic; to burns and suppurating wounds and ulcers, bed sores (here also as an ointment, gr. viij.–xv. in ʒ iiss. of lard or vaselin), scaly eruptions of the skin (1 part to 10 of glycerin ointment), soft and hard chancres and especially commended in the treatment of tuberculous processes, where it is applied by being blown into the sinuses and openings leading into tuberculous joints, and in tuberculosis of the peritoneum, larynx, fauces, and nose. Recently a mixture of 1 part iodoform, 5 parts guaiacol, and 10 parts olive oil has been recommended for injection deep under the skin of the back (a daily injection of ♏ xv.–xlv. of the mixture) in pulmonary tuberculosis and pleuritic exudations, and is said to act very well without exciting any toxic symptoms other than a little colic and diarrhœa. It is also employed as a snuff in ozæna, in bacilla (equal parts of iodoform and cacao butter) for introduction into the urethra in the treatment of gonorrhœa, into the cervical canal, and into fistulas. Mixed with glycerin (ten per cent) it is used for impregnating vaginal tampons for the treatment of endometritis and leucorrhœa; with oil or glycerin (ten per cent) for injection into tuberculous abscesses and joints; with collodion (sometimes combined with tannin) in the treatment of various skin diseases, enlarged glands, and as a dressing to small wounds; and finally as iodoform gauze (ten to twenty per cent).

Subcutaneously strongly recommended as especially efficacious in the treatment of secondary and early tertiary syphilis.

Iodoformum Bituminatum.—Iodoform which has been rendered odorless by treatment with tar, and employed in the same way and for the same purposes as iodoform itself.

℞ Boli albi,
Ol. olivæ, ... āā ʒ i.
M. bene, et adde
Liq. plumbi acetat., ... ʒ v.
Iodoformi, ... ʒ ij.–iv.
Caffeæ tostæ pulv., ... q.s.
M. et ft. pasta. S. A most excellent application to burns.

℞ Iodoformi, ... ʒ ss.
Ung. glycerini, ... ʒ v.
M. S. To be applied at night. (Scaly eruptions of the skin.)

℞ Iodoformi, ... gr. xv.
Glycerini, ... ʒ i.
Aq. destillatæ, ... ℥ iij.
M. S. For washing out the bladder in cystitis.

℞ Iodoformi, ... ʒ ss.
Caffeæ tost. pulv., ... gr. xv.
Lanolini, ... ʒ iv.
Adipis, ... ʒ ss.
M. S. Odorless iodoform ointment. (For application to enlarged glands and skin eruptions.)

℞ Iodoformi, ... ʒ ss.
Bals. peruv., ... ʒ i.
Ol. theobromæ,
Ceræ albæ, ... āā gr. xlv.
Magnesiæ, ... ʒ ss.
M. et div. in suppos. No. 12. S. For hemorrhoids, and in carcinoma of the uterus, bladder, or rectum.

℞ Iodoformi, ... gr. xij.
Ol. ricini,
Ol. menth. pip., ... āā ♏ xij.
Collodii, ... ʒ i.
M. S. For external use.

℞ Iodoformi, ... gr. xlv.
Glycerini, ... ʒ iiss.

M. S. For hypodermic injection in syphilis, beginning with ♏ xv. and increasing to ♏ xl. (equivalent to gr. v.–xij. of iodoform).

℞ Iodoformi, ... ʒ ij.
Glycerini, ... ℥ iiss.

M. Shake thoroughly before using. S. Two and one-half to 5 drachms to be injected at one time, every week or fortnight, into tuberculous joints or abscesses, from four to eight injections in all being given. The joint should be kept quiet for some time after the injection has been made.

IODOLUM.

An odorless powder, containing 89% iodine, readily soluble in ether and hot alcohol. A substitute for iodoform, which it resembles in its therapeutic, and also in its toxic, action.

Internally employed in doses of gr. iss.–iij. or more, in pill, in the treatment especially of syphilis, goitre, and other affections as a succedaneum of iodide of potassium.

Externally in the same manner and dosage, and for the same purposes, as iodoform. It is especially recommended for insufflations several times a day, in tuberculous laryngitis, as it has no odor, is non-irritant, does not affect the appetite, and is therapeutically effective.

The formula above given for prescribing iodoform can be employed for iodol, simply substituting this for the iodoform.

IODUM.

Soluble in 5,000 parts of water, 10 parts of alcohol, 33 parts of glycerin, and readily soluble in ether, chloroform, and aqueous solutions of iodide of potassium.

Internally employed very seldom in doses of gr. $\frac{1}{12}$ (maximum gr. i., or iij. pro die) in solution for the same indications as when externally used; as an addition to cod-liver oil in the proportion of gr. iss. in ʒ ij.–iij.; and finally in poisoning with mercury, lead, copper, strychnine, etc.

Externally almost solely in combination with iodide of

potassium in the form of Lugol's solution (see formula below), and still more commonly as—

Tinctura Iodi.—*Internally* employed (rarely) in doses of 1 to 10 drops (maximum) pure or diluted with aromatic waters in vomiting of pregnancy, arthritis deformans (8 to 10 drops three times a day), tertiary syphilis, malaria, cholerine, and cholera nostras (1 to 2 drops every ten to fifteen minutes).

Externally applied pure (strongly counter-irritant) or diluted with alcohol—

1. For painting over the skin in cases of very superficial acute or chronic inflammation (to promote resorption of the exudative products), especially in felon, phlegmon, pleurisy (of very questionable utility here); in vaginitis, applied as the speculum is being withdrawn; also in acute and chronic rheumatism and arthritis deformans; and finally in many syphilitic, scrofulous, and parasitic skin diseases.

2. The most successful employment of tincture of iodine, seldom pure but more often diluted with solution of iodide of potassium, is in the form of injection into fistulous tracts and other pathological cavities in order to excite an adhesive inflammation; also after removal of the fluid in hydrocele (caution is necessary), ovarian cysts, empyema, echinococcus cysts, more particularly of the liver, hydrarthrosis, ganglion, etc.

3. By parenchymatous injection to effect the reduction of hypertrophied lymphatic glands, of enlarged prostate (through the rectum), and especially in goitre (when it is simply hyperplastic and not cystic or aneurismal), beginning with 5 minims of the pure tincture and gradually increasing to 15. (The decrease in size of the goitre in many cases is accompanied with a peculiar form of cachexia, differing materially from iodism, resembling the cachexia strumipriva.)

The use of iodine in large doses, and even in small ones, not seldom causes coryza, acne, and other skin eruptions, conjunctivitis, salivation, cough, and digestive disturbances.

For iodine poisoning, especially the swallowing of tincture of iodine, boiled starch, albuminous solutions, and sulphite of sodium should be given in large quantities, and the treatment proper for gastro-enteritis instituted.

4. In addition to the above, iodine is also used by inhalation in syphilitic affections of the larynx and pharynx.

℞ Iodi, ... gr. ss.
Potass. iodidi, ... ʒ ss.
Aq. destillatæ, ... ʒ xij.
M. S. For injections, after puncture of the sac, in hydrocele, etc.

℞ Tinct. iodi, ... gtt. vi.
Potass. iodidi, ... ʒ iss.
Aq. destillatæ, ... ℥ iv.
M. S. One tablespoonful three times a day. (Vomiting of pregnancy.)

℞ Iodi, ... gr. ss.–i.
Potass. iodidi, ... gr. viij.–xv.
Aq. destillatæ, ... ℥ i.
M. S. For inhalations in syphilis of the larynx and pharynx.

℞ Tinct. iodi,
Tinct. gallæ,
(or Tr. aconiti), ... āā ℥ iiss.
M. S. To be painted over the parts, in periostitis (of the maxilla) and epididymitis.

℞ Iodi, ... gr. xv.
Potassii iodidi, ... ʒ ss.
Aq. destillatæ, ... ℥ i.
M. S. Lugol's solution of iodine.

IPECACUANHA.

Internally employed: 1. As an emetic (especially in laryngeal diphtheria and false croup) which can be given to children and debilitated persons, and when diarrhœa is present. For robust adults it may be employed (often in combination with tartar emetic) in doses of gr. v.–xv. in powder, suspension, or as an infusion (ʒ ss.–i. in ℥ v.) every ten or fifteen minutes. (Tannin is an antidote when too much has been taken.)

2. Empirically as a solvent expectorant in bronchial catarrh (initial doses, gr. $\frac{1}{6}$ to i. every hour, later every two to three hours; or in infusion, gr. viij.–℥ v.); especially recommended for debilitated persons and children in any stage of the disease when the expectoration is dry and scanty.

3. In diarrhœa and dysentery, combined with opium, in

doses of gr. $\frac{1}{6}$ to i. several times a day in powder or in an infusion of gr. viij. in ℥ v. The action of ipecac here is doubtful, and whatever good effects are observed are probably referable to the opium.

Syrupus Ipecacuanhæ.—May be given to small children as an emetic in doses of a teaspoonful, and to older children as an expectorant in bronchial irritation, usually as a constituent of other mixtures.

Tinctura Ipecacuanhæ, Vinum Ipecacuanhæ.—These are employed as a substitute for the infusion, as an adjuvant in expectorant, and possibly stomachic, mixtures and tinctures. Dose, pure, 5 to 20 drops several times a day; emetic dose, 60 drops.

Pulvis Ipecacuanhæ et Opii.—Dover's powder (see Opium).

Emetina.—*Internally* the alkaloid is employed as an emetic in doses of gr. $\frac{1}{12}$ to $\frac{1}{6}$, repeated once or twice if necessary, in powder or solution. (It is strongly irritant, and easily produces gastritis.)

℞ Pulv. ipecac., ... gr. xl.
Ant. et potass. tartr., ... gr. iss.
Amyli, ... gr. xxx.
M. et div. in part. No. 4. S. Emetic powders, one to be taken every ten to fifteen minutes until vomiting is produced, and then warm chamomile tea to be drunk. The addition of starch increases the action and also restricts it to the stomach.

℞ Pulv. ipecac., ... gr. xv.
Pulv. glycyrrh., ... ℥ ss.
Ft. infus. cum
Aq., ... ℥ v.
Adde
Ammon. chloridi, ... gr. lxxx.
Vini antimonii, ... ʒ iiss.
M. S. One tablespoonful every hour, as an expectorant.

℞ Pulv. ipecac., ... gr. viij.
Extr. krameriæ,
Extr. columbæ, ... āā gr. xxiv.
Extr. trifol. fibrin. (marsh trefoil), . . ʒ ss.
M. et ft. pil. No. 50. S. Four or five pills every two hours. (Diarrhœa.)

℞ Pulv. ipecac., ... ʒ ss.–i.
Antimon. et pot. tartr., ... gr. iij.
Oxymel. scillæ, ... ʒ i.
Aq. destillatæ, ... ʒ ij.

M. S. A teaspoonful to a tablespoonful (the bottle being shaken) every ten to fifteen minutes until the desired effect is produced.

℞ Pulv. ipecac., ... gr. ij.
Ammon. chloridi,
Pulv. glycyrrh.,
Sacch. albi, ... āā ʒ i.

M. et ft. chart. No. 10. S. One powder every two hours, as an expectorant.

℞ Pulv. ipecac.,
Pulv. opii, ... āā gr. viij.
Pulv. cascarillæ, ... ʒ i.

M. et div. in chart. No. 10. S. One powder three times a day. (Diarrhœa.)

JALAPA.

A drastic cathartic.

Internally employed: as a local stimulant in doses of gr. i.–v. several times a day; as a mild purgative in doses of gr. v.–viij.; as a drastic cathartic in doses of gr. viij.–xxx. at once, or the same amount in fractional doses at short intervals. For children it is given as a cathartic in doses of gr. iss.–v. in powder, pill, or electuary.

Resina Jalapæ.—Contains the active principles of the root. It is given in half the dose of the latter.

Sapo Jalapinus.—Composed of resin of jalap and soap, each 4 parts, and dilute alcohol, 8 parts, evaporated down to 9 parts. It is the mildest preparation of jalap, and is employed especially when it is desired to administer the remedy for a long period, in doses of gr. viij.–xxx. alone in pill form, or combined with other laxatives.

℞ Resinæ jalapæ, ... gr. viij.–xv.
Hydrarg. chlor. mitis, ... gr. iv.
Sacch. albi, ... gr. xxx.

M. et div. in chart. No. 5. S. One powder every two hours, as a purgative.

℞ Pulv. jalapæ, ... 3 iiss.
Pulv. rhei,
Elæosacch. limonis, ... āā gr. lxxv.
Potass. bitartratis,
Sulph. loti, ... āā 3 v.
M. et ft. pulvis. S. A teaspoonful three times a day. (Hemorrhoids.)

℞ Extr. aloes,
Extr. rhei,
Sapon. jalap., ... āā 3 ss.
Extr. glycyrrh., ... q.s.
M. et ft. pil. No. 40. S. One or two pills morning and evening.

℞ Pulv. jalapæ,
Pulv. rhei, ... āā gr. xv.
Podophyllini, ... gr. vi.
Extr. belladon., ... gr. iij.
Extr. taraxaci, ... q.s.
M. et ft. pil. No. 40. S. One or two pills at night.

JEQUIRITY.

The seeds of the Abrus precatorius.

Externally employed in infusion or cold maceration for three to twenty-four hours (gr. viij.–xv. in ℥ iij.) as an application (by means of a camel's-hair brush) to the conjunctiva in long-standing cases of trachoma, but only when it is associated with extensive cicatricial formation of the palpebral conjunctiva and keratitis pannosa. The remedy excites an inflammation of the conjunctiva which begins within a few hours and gradually increases, reaching its maximum on the second or third day.

JUGLANS.

The inner bark of the root of Juglans cinerea, butternut. A bitter astringent.

Internally employed in infusion or decoction (10 or 20 parts in 200) as a tea in the morning instead of coffee, in scrofula when associated with digestive disturbances and a tendency

to diarrhœa; or it may be given after maceration for two days in wine.

It may be used in baths (℥ x.–xv. of a decoction to each bath).

Extractum Juglandis.—Officinal in the U. S. Pharmacopœia; given in doses of gr. v.–xv.–xxx.

JUNIPERUS.

Internally employed as a diuretic in combination with synergistic remedies, in doses of a tablespoonful of an infusion (15:200), in dropsy. It is also sometimes used in maceration in beer, wine, or spirits. Also in species (*q.v.*); usually more as a domestic remedy.

It should not be employed when inflammatory diseases of the kidneys are present.

Externally used as spray inhalation, and as an addition to aromatic baths (⅓ to ½ pint of the infusion in three pints of water).

Spiritus Juniperi.—(One part juniper berry in 4 parts alcohol.)

Internally employed in doses of 20 to 60 drops in water or wine, or as a constituent of other mixtures.

Externally used by embrocation in œdemas, etc., and in compresses.

Oleum Juniperi.—*Internally* employed in doses of 3 to 6 drops several times a day, in ethereal solution, capsules, or pill form, as an anthelmintic, and in the treatment of diseases of the skin.

Externally applied pure or in ointments (1:5) in chronic skin diseases, rheumatism, arthritis, etc.

Succus Juniperi Inspissatus.—An inspissated juice of fresh juniper berries. Given in doses of a teaspoonful three or four times a day pure (sweetened with sugar) and as an ingredient (20 to 50 parts in 200) of diuretic mixtures and electuaries, especially in renal dropsies of children.

℞ Infus. juniperi (juniperi, ℥ iiss.), . . . ℥ v.
Liq. potass. acetat.,
Oxymel. scillæ, ... āā ℥ ss.
(or Succi juniperi, ... ℥ ss.)
M. S. A tablespoonful every two hours. (Diuretic.)

℞ Fruct. juniperi, ... ℥ i.
Sem. petroselini,
Rad. levistici, ... āā ℥ ss.
M. et ft. species. S. Diuretic tea.

KAIRINUM.

Antipyretic. A white, odorless, crystalline powder, synthetically formed from quinolin, soluble in 6 parts of cold water and 20 parts of alcohol.

Internally employed in doses of gr. viij.–xv. in capsules or wafers, it rapidly and markedly lowers the temperature, but the latter rises again in a short time, accompanied with a chill, and this, together with the unpleasant incidental effects, such as headache, vomiting, sweating, albuminuria, cyanosis, and collapse, has led to the almost complete abandonment of the drug. Its action in intermittent and relapsing, and also in yellow fever, is uncertain at best.

KAMALA.

A brick-red powder without odor or taste.

Employed as an anthelmintic in tænia, in doses of ʒ iiss.–iv. as a powder in wafers, rubbed up with water, or in wine or meat broth, taken in two doses from one-half to one hour apart, in the morning. Children under four years bear gr. xx. very well, and those over eight years of age gr. xxx.–xlv. It is slightly laxative. It is also given in the form of an alcoholic extract and of a resin, in electuary or tablets, but the preparation should not be too old.

℞ Kamalæ,
Brayeræ,
Aspidii, ... āā ʒ ss.
Mel. despumat., ... ʒ v.
Aq. anisi, ... ℥ iij.
M. S. Two teaspoonfuls every two hours for children.

℞ Kamaæl, ... gr. xl.
Tamarindi,
Syr. limonis, ... āā q.s.
M. et ft. electuarium. S. To be taken in two doses.

KAOLINUM.

A soft white powder, a decomposition product of granite and other rocks containing feldspar. It is employed as an excipient in pills containing nitrate of silver and permanganate of potassium, and also in ointments.

KAVA-KAVA.

The powdered root of Piper methysticum.

Internally recommended in infusion or decoction (℥ i.–iss. in ℥ iij.–v.) as a diaphoretic and in gonorrhœa with orchitis and cystitis; but it has not been sufficiently used to determine its value.

Extractum Kavæ.—*Internally* employed in doses of gr. iss. several times a day (gr. x.–xij. pro die) in pills.

Extractum Kavæ Fluidun.—*Internally* employed in doses of 15 to 30 drops several times a day, in water, to meet the indications above mentioned.

KEPHIR.

Kephir is milk in which a vinous fermentation has been brought about by means of a ferment contained in kephir-seed from the Caucasus (see also "sour milk" under Lac), and which, according to Munk and Uffelmann, contains 3.8% albumin, 2% each of fat and sugar, 0.9% lactic acid, 0.8% alcohol, and 0.55% salts. It is in a state of continuous fermentation, and therefore of constant change as regards both its composition and its medicinal action; so that fresh kephir of the first two days, which is used especially in cases of disease of the thoracic organs, is moderately laxative, while that three or four days old has a binding effect in diseases of the abdominal viscera. But it varies not only according to the duration of the vinous fermentative process, but also according to the kind of cow's milk used, whether raw or boiled, creamy or skimmed, pure or diluted with water. It resembles kumyss in its action, and is to be regarded purely as a dietetic article, like milk itself, only being more easily assimilated than the latter. In kephir the casein is peptonized and dissolved; in kumyss, undissolved.

Good kephir should foam like beer, should be no more acid than thick fresh milk, should not separate into a clear and a turbid layer, but should for the first few days have the consistence of good cream, and only later begin to grow more fluid.

This pleasant, slightly alcoholic, acidulated, and carbonated kephir is especially indicated in cases of weak digestion when it is desired to improve the nutrition and when the use of ordinary milk is not possible or desirable. The amount to be taken varies according to the individual and according to his condition, and may be from one to six soda-water bottles full a day. The "cure" should begin with about 10 ounces and rise gradually to three pints or more, a glass being sipped before and after meals, the patient in the mean while walking about or taking some other form of gentle exercise.

KERATINUM.

A substance obtained by removing the portion of horn shavings soluble in pepsin and hydrochloric acid, and dissolving the residue in ammonia or acetic acid. It is used for coating pills which are intended for solution only in the alkaline fluids of the intestinal canal, and not in the acid gastric juice. Such are pills containing alum, nitrate of silver, anthelmintics, arsenic, bismuth, acetate of lead, phosphorus, mercury, tannin, etc.

KINO.

A styptic.

Internally employed in doses of gr. iij.–xxij. in powder, in the treatment of diarrhœa, dysentery, and hemorrhages.

Externally used as a styptic powder, and in tooth-powders; dissolved in dilute alcohol for application on compresses, injections, mouth washes, enemas, etc.

KOUSSO.

See Brayera.

KRAMERIA.

Rhatany. An astringent, containing about twenty per cent of tannic acid, and given to meet the indications of this drug.

Internally employed in doses of gr. viij.–xv. several times a day in powder, pills, or decoction of ten-per-cent strength.

Externally in five to fifteen per cent decoction as a gargle, mouth wash, or by enema.

Extractum Krameriæ.—*Internally* employed in doses of gr. viij.–xxiv. several times a day in pills and mixture for the same purposes as the crude drug.

Tinctura Krameriæ.—Dose: ʒ ss.–ij. several times a day.

℞ Decocti krameriæ (krameriæ, ʒ iiss.), ℥ v.
Tinct. opii, ... ♏ xv.–xxx.
Syr. amygdalæ, ... ℥ i.
M. S. A tablespoonful every hour or two. (Diarrhœa.)

℞ Decocti krameriæ (krameriæ, ℥ ss.), . ℥ vi.
Tinct. myrrhæ, ... ʒ i.
Spts. cochleariæ, ... ʒ vi.
M. S. Mouth-wash.

℞ Decocti salep., ... ℥ iiss.
Tinct. krameriæ, ... ʒ ss.–i.
Syr. fœniculi, ... ʒ iiss.
M. S. A dessertspoonful every hour. (Diarrhœa in children.)

KUMYSS.

A fermenting, strongly carbonated drink, obtained originally from the milk of mares of the Kirghiz steppes, but now from other sorts of milk. According to Munk and Uffelmann, kumyss prepared from mare's (or cow's) milk contains (the proportions of cow's-milk kumyss are in parentheses): Albumin, 2.2% (3.25); fat, 2.12% (2.07); sugar, 1.53% (1.81); lactic acid, 0.9% (0.7); alcohol, 1.72% (1.9); carbonic acid, 0.8% (0.8); salts, 0.29% (0.52). It is employed in quantities of one or two bottles a day as a good and easily digestible nutrient material for poorly nourished, anæmic, cachectic, and phthisical (but only well-to-do) patients. It is readily taken and renders good service.

LAC.

Milk is frequently not well borne by adults, and some individuals have an idiosyncrasy which makes it intolerable to them, although this can often be overcome by taking a little

bicarbonate of sodium after it or mixing it with arac or brandy (milk punch). When it is well borne, taken in not too large quantities at a time, it constitutes an excellent food, since it contains all the essentials for human nutriment; nitrogenous substances, casein and albumin, 4 to 4.3%; fat (butter), 3 to 3.8%; carbohydrates (sugar of milk), 3.7%; and salts, 0.6%. (Ass' milk contains: albumin, 1.8 to 2%; fat, 1.5%; carbohydrates, 6.5%; salts, 0.3%. Goat's milk: albumin, 3.7%; fat, 4%; carbohydrates, 4.4%; salts, 0.5%. The first is richer in sugar than cow's milk; the last, in fat and casein. Goat's milk is therefore not suitable for a "milk cure" in persons with weak digestion.)

Boiled cow's milk, an excellent food under all circumstances, is recognized to be the most natural, and therefore the best, substitute for mother's milk. Most cow's milk, even when the freshest, has an acid reaction. In order to render it suitable for an infant's food it should be neutralized with bicarbonate of sodium, by means of which also (with the addition of a little gum arabic) a less lumpy coagulation is obtained. The milk of tuberculous cows, of animals far advanced in pregnancy, and of those fed on distillery mash, on green fodder, or potatoes is injurious. Cow's milk may be made more closely to resemble human milk by dilution with water, or 1 part to 3 of thoroughly cooked oatmeal or barley water, and the addition of a little milk, sugar, and cream. (See also below, under Biedert's Artificial Cream Mixture.)

Milk is one of the best, and at the same time most easily obtainable, antidotes in poisoning by caustic metallic substances.

Full Milk Diet.—Milk, sweet and sour, is used as the sole food, in addition to which only a little white bread is allowed. More than two to three quarts cannot be taken without injury for a "cure" extending over many months, as larger quantities may lead to the production of dilatation of the stomach. It is therefore advisable to give a little meat with alkalies during a long-continued course.

Half-Milk Diet.—The patient takes three or four times a day, or at least morning and evening, one-quarter to one pint of milk, in addition to a moderate allowance of white meat, etc.; acid and fatty foods or those producing flatulence, vegetables, and alcoholic beverages being forbidden. It is advisable

to combine the milk with Seltzer or Vichy water, or liquor calcis.

Lac Condensatum (condensed milk) is a tolerable substitute for fresh cow's milk, which can also be used for infants. For the first few days it may be given in dilution of 1 part in 18 of water, gradually raised to 1 part in 12, but never stronger. After the fifth month it is not suitable for use as the sole food. A disadvantage of condensed milk is found in the large amount of cane sugar which it contains.

Biedert's Artificial Cream Mixture is a paste made of albuminate of potassium, butter, equal parts of milk and cane sugar, and the salts contained in human milk, in such proportions that when thinned with water it makes a milk corresponding to No. 1 in the table given below. The addition of a few spoonfuls of cow's milk increases the value of this mixture, and by gradually adding more and more can bring the child gradually to a diet of natural milk.

Biedert and Ritter recommend the following cream mixtures for the nourishment of infants, the figures at the left-hand side indicating the age in months for which the corresponding mixture is best suited:

	Cream.	Milk.	Water.	Sugar of Milk.	
1.	4 ounces.	— ounces.	12 ounces.	4 ounces.	
2.	4 "	2 "	12 "	4 "	Six even teaspoonfuls.
3.	4 "	4 "	12 "	4 "	
4.	4 "	8 "	12 "	4 "	
5.	4 "	12 "	12 "	4 "	
6.	— "	16 "	8 "	2½ "	Four do.

To be freshly mixed morning and evening and immediately boiled. Cane sugar is usually just as well borne as milk sugar.

Lac Ebutyratum (buttermilk), sweat or sour, is milk with but little fat (albumin, 3%; fat, 1.3%; carbohydrates, 3%; salts, 0.55%) and is employed as a cooling laxative, and also sometimes, like milk itself, as a "cure" continued for several weeks in diseases of the stomach and phthisis, often as a domestic remedy. Sour and not perfectly fresh buttermilk readily induces digestive derangements and diarrhœa.

Sour milk (albumin, 4%; fat, 3%; sugar, 4%) is used as an article of food, and is also highly recommended as a remedy in acute summer diarrhœa in children and adults, dyspepsia,

loss of appetite, chronic affections of the stomach and intestinal canal, scurvy, etc. It is quickly prepared by adding 8 to 10 parts of boiled sweet milk to sour milk. If it is frequently shaken up there is made, instead of a simple mixture of the separated constituents (cream, whey, and serum), a creamy fluid which is identical with kephir; so that the ordinary lactic-acid bacillus is the kephir ferment.

Serum Lactis Dulce (whey), made by adding 1 part of rennet wine to 200 parts of milk, is milk deprived of its butter and casein, a watery solution of milk sugar and salts with a little of the abstracted constituents remaining. (Albumin, 0.5%; fat, 0.3%; carbohydrates, 3.6%; salts, 0.5%.)

When consumed in large quantities, whey probably hastens metabolism, and acts as a mild laxative and diuretic; and when taken warm is useful, like warm drinks in general, in bronchial catarrh. It nutrient value is almost *nil*, and it may, when taken in too large quantities, cause digestive disturbances.

"Whey cures," practised amid pleasant scenery and in mild regions (really fresh-air cures), are of great utility in the early stages of respiratory diseases and consumption, but without any doubt the actual curative value of the whey is greatly overestimated.

Serum Lactis Acidum (sour whey) is more decidedly laxative, as it is made with 1 part of bitartrate of potassium to 100 parts of milk, instead of with calves' rennet.

Serum Lactis Aluminatum (alum whey), made by adding 1 part of alum to 100 parts of milk, is used when there is a tendency to diarrhœa and intestinal hemorrhage.

Serum Lactis Martiatum (iron-whey) is best prepared by means of tablets of ferrated rennet.

Serum Lactis Tamarindinatum (tamarind-whey) is made by adding 1 part of tamarind pulp to 25 parts of boiling milk, and is employed as a drink when there is a tendency to constipation.

LACTUCARIUM.

The inspissated milky sap of Lactuca virosa.

Internally employed in doses of gr. ss.–iij. several times a day (maximum dose, gr. v., or gr. xv. per day) in pills or emulsion. It acts similarly to, though less actively than, opium. To obtain a hypnotic effect, doses of gr. viij.–xxx. are necessary.

Extractum Lactucarii.—*Internally* employed in doses of gr. ss.–ij. (maximum daily dose, gr. xxxv.) like the preceding.

LAMINARIA DIGITATA.

The stems of Laminaria Cloustoni, which swell in water, and are used instead of sponge-tents to dilate the cervical canal.

LANOLINUM.

A fat (containing twenty-three to twenty-five per cent of water) obtained from sheep's wool, which is used as a basis for ointments (softer if mixed with fifteen to thirty per cent of lard), and promotes the absorption through the skin of medicinal substances incorporated with it. It is neutral, does not turn rancid, prevents the formation of scales, and represses secretion. It can take up several times its own weight of water. It is also employed as a cosmetic in cases of scaling, thickening, roughness, and chapping of the skin (see formulæ). It does not, however, like the vaselin salves, produce softness of the skin.

Lanolinum Anhydricum.—A clear, yellow fat obtained by boiling lanolin with water, of which it takes up during the boiling 180% of its weight (afterward being deprived of all its water), which forms the only ointment that will adhere to mucous membranes. It is used for the skin in those cases in which it is desired to avoid all moisture.

℞ Lanolini, ... ℥ ss.
Ol. theobrom., ... gr. lxxx.
M. et ft. unguentum.

℞ Lanolini, ... ʒ iiss.
Sodii boratis, ... gr. xv.
Aq. rosæ, ... ℥ iij.
M. et ft. lotio.

℞ Lanolini, ... ʒ iv.
Paraffin. fluid., ... ʒ i.
Vanillin., ... gr. i.
Ol. rosæ, ... gtt. i.
M. et ft. unguentum.

These three are well suited for cosmetic use in the case of scurfy, rough, thickened, or chapped skin.

℞ Acid. salicylici, ... 3 ss.
(or Acid. borici, ... 3 i.)
Adipis, ... 3 i.
Lanolini, ... ʒ ss.
M. S. For external use.

℞ Iodoformi, ... 3 ss.
Lanolini anhydr., ... 3 v.
M. S. Iodoform-lanolin salve.

LICHEN ISLANDICUS.

See Cetraria.

LINUM.

Flaxseed or linseed. The ground seed is used to prepare poultices.

Oleum Lini.—*Externally* employed, mixed with equal parts of lime water (Carron oil), for burns.

LIPANINUM.

Prepared by a process of saponification from olive oil, of which it has the appearance and taste, containing six per cent free oleic acid.

Internally recommended as an easily digestible substitute for cod-liver oil. Patients take it readily.

LIQUOR AMMONII ACETATIS.

Spirit of Mindererus. See Ammonii Acetas, and the other ammonium salts.

LIQUOR CALCIS.

See Calx.

LIQUOR FERRI ACETATIS.

See Ferri Acetas, and the other iron preparations

LIQUOR POTASSII ARSENITIS.

See Acidum Arseniosum.

LIQUOR SODII SILICATIS.

See Sodii Silicas.

LITHARGYRUM.

See Plumbi Oxidum.

LITHII BROMIDUM.

Internally employed in doses of gr. iij.–viij. several times a day, best in solution, in neuroses, hysteria, insomnia (gr. iij.); in epilepsy (gr. viij.–xlv.). It is said to surpass the other bromides in the treatment of epilepsy, but this may be doubted.

LITHII CARBONAS (BENZOAS, HIPPURAS, CITRAS, SULPHAS).

Internally employed according to the special indications of each (*e.g.*, the benzoate and hippurate when there is uric acid in excess) in doses of gr. i.–viij. several times a day, in powders or pastilles, also in artificial carbonated waters, or with wine (gr. ij.–℥ iij.) in gout and urinary calculi (uric-acid diathesis), and in herpetic diseases.

Externally in lotions and fomentations as a solvent of small tophi in chronic gout (gr. xv.–℥ iij. of water), and as injections into the bladder to dissolve uric-acid calculi (gr. xlv.–℥ iij.).

In solutions of gr. xv.–xxx. in ℥ vi. of water it is used in gargles and spray as a solvent of diphtheritic and croupous membranes.

℞ Lithii carbonatis, ... gr. xl.
Sacchari albi, ... ʒ xij.
M. S. As much as can be taken on the tip of a knife-blade several times a day in a wine-glass of water.

℞ Lithii carbon., ... gr. xv.
Aq. destillatæ, ... ℥ v.
Ext. glycyrrh., ... ʒ i.
M. S. One or two tablespoonfuls every two hours.

LITHII IODIDUM.

Internally recommended in doses of a tablespoonful four to five times a day of a solution of ʒ i. in ℥ vi., in articular rheumatism.

LITHII SALICYLAS.

Internally employed in doses to gr. iss.–viij. several times a day (up to ʒ i. pro die), in solution or powder, in acute, sub-acute, and chronic articular rheumatism when salicylate of

sodium fails to relieve the pain and other symptoms. It contains more salicylic acid than the sodium salt, with less toxic effects, and the presence of the lithium increases its therapeutic action. It is used, and hippurate of lithium also, in doses of gr. xv. (ʒ iiss. a day) as a specific in true gout, the so-called arthritis urica, at the same time with Ems, Vichy, Seltzer, and other mineral waters; and in doses of gr. xv. a day in Apollinaris water for long-continued use in uric-acid gravel.

LITHII SULPHO-ICHTHYOLAS.

See Ichthyolum.

LOBELIA.

Employed (rarely) in decoction (ʒ ss.–iss. in ℥ iij. water) in spasmodic affections of the vagus nerve, asthma, cardialgia, etc. Usually given in the form of the tincture.

Tinctura Lobeliæ.—Given in doses of 10 to 20 drops (maximum dose, ♏ lxxv. a day), usually in mixture with tincture of opium, as a narcotic (like tobacco), in various forms of asthmatic and dyspnœic paroxysms, and sometimes with good results.

LUPULINUM.

An antaphrodisiac and bitter.

Internally employed in dyspeptic conditions in doses of gr. ij.–xv. in powder, pill, alcoholic solution (dietetically consumed in beer); but especially used as an antaphrodisiac in doses of gr. v.–viij. in powder or pill, in nymphomania, pollutions, etc., and in all conditions of irritation and increased excitability of the genital apparatus.

Extractum Lupulini.—*Internally* employed in the above-mentioned indications in doses of 5 to 15 grains several times a day in pill form.

℞ Lupulini,
Extr. lupulini, ... āā gr. xv.
Camphoræ, ... gr. iss.

M. et ft. pil. No. 10. S. One or two pills at night. (Sexual irritability, frequent pollutions, etc.)

℞ Lupulini, ... ℥ iss.
Camphoræ, ... gr. xv.
Extr. taraxaci, ... q.s.

M. et ft. pil. No. 90. S. Six pills from one to three times a day, in cases of increased sexual irritation, too frequent pollutions, etc.

LYCOPODIUM.

The fine sporules of Lycopodium clavatum, rich in a fixed oil.

Internally employed in suspension in water (℥ ss.–℥ v.) in irritable conditions of the urinary organs, but of no more use than the fats in general.

Externally, pure or with about ¼ part of oxide of zinc, as a dusting powder for moist eczema, herpes zoster, and intertrigo, and also as a covering for pills.

LYSOLUM.

A distillation product of tar, occurring in the form of an oily fluid, having an odor very like carbolic acid and creolin, and is a more powerful antiseptic, while being less toxic, than either of these substances.

Externally employed in solution of ♏ iss.–iv. in distilled water for syringing out the ear in otorrhœa and especially for softening plugs of wax and epithelium in the external auditory canal; in 0.3% solution for washing out the uterus and on dressings for wounds (three per cent for septic wounds); and in two-per-cent solutions for disinfection of the skin. In otomycosis (aspergillus nigricans) the meatus may be filled twice a day, for ten minutes at a time, with an alcoholic solution of lysol. It is also recommended, by reason of its cheapness, for the disinfection of the product of an abortion, stools, furniture, soiled clothes, rooms, etc.

MACIS.

See Myristica.

MAGNESIA.

Calcined magnesia is, like the carbonate of magnesium (*q.v.*), a laxative, stronger (for children), however, than the atter, in doses of gr. v.–xx.; it is also employed as an antacid

in doses of gr. iss.–viij., and as an absorbent for carbonic acid gas in meteorism. The long-continued internal use of magnesia has been repeatedly recommended for warts. Given as a thin milk in 20 to 30 parts of water, and in about 20 times the amount of the poison swallowed, it is an antidote in poisoning by arsenious, sulphuric, nitric, hydrochloric, acetic, and oxalic acids, or by corrosive sublimate or the salts of copper (not an antidote to phosphorus), and is one of the constituents of the antidote for arsenic (see Ferri Sulphas).

Trochisci Magnesiæ.—Made with chocolate, and contain 1½ grains each.

℞ Magnesiæ, ... ʒ ij.
Aq. destillatæ, ... ℥ v.
Aq. aurant. flor., ... ʒ i.
Sacch. albi, ... ℥ ss.

M. S. Shake the bottle before using. Given in doses of a tablespoonful every hour, it is mildly laxative and antacid. (Similar to milk of magnesia.)

℞ Magnesiæ, ... ʒ vij.
Aq. destillatæ, ... ℥ x.

M. S. Four to six tablespoonfuls every ten minutes in poisoning by any of the above-mentioned substances. (Magnesia in Aqua, or Magnesia Hydrica.)

MAGNESII BOROCITRAS.

Boracites, obtained from a native borate found near Stassfurt.

Internally employed in doses of a tablespoonful every two hours of a solution of ʒ i.–ij. in ℥ iv. of water with ʒ v. of simple syrup; or of as much as can be heaped on the tip of a knife-blade of a powder made with equal parts of sugar, several times a day; or a solution of the borocitrate with bicarbonate of sodium in a quart of water may be taken as a mineral water. It is employed in vesical troubles of various kinds, but especially in gravel and renal or vesical calculi.

℞ Magnesii borocitratis, . . ℥ ij.
Sacch. albi, ... ℥ iv.
Ol. limonis, ... gtt. iv.

M. et ft. pulvis. S. A tablespoonful daily in water.

MAGNESII CARBONAS.

Antacid and absorbent. In order to reduce the volume of the ordinary carbonate of magnesium, as also of calcined magnesia, it may be moistened, dried, compressed, and again powdered, whereby washed magnesium carbonate is obtained.

Internally employed in doses of gr. iij.–vi. several times a day in powder, effervescent powder, lozenges, electuary, or in suspension, in abnormal acidity of the stomach and intestinal canal combined with constipation; and also in smaller doses in acid diarrhœa which disappears with the removal of its cause. It is also given as an antidote in cases of poisoning with the substances mentioned under Magnesia.

Externally as a tooth powder, and as a dusting-powder in intertrigo.

Pulvis Magnesiæ cum Rheo.—Composed of carbonate of magnesium, 12 parts; oil-sugar of fennel, 8 parts; and powdered rhubarb, 3 parts. Employed as an antacid and laxative, for children in doses of as much as can be taken on the end of a knife-blade, and for adults a teaspoonful, several times a day.

℞ Infusi rhei (℥ iiss. rhei), ... ℥ v.
Magnesii carbonatis, ... ℥ iiss.
Syr. rhei, ... ℥ i.

M. S. A tablespoonful every hour until the bowels move. Shake the bottle.

℞ Magnesii carb., ... ℥ i.
Aq. menth. pip., ... ℥ iij.
Syr. aurant. cort., ... ℥ ss.

M. S. Shake the bottle, and give a tablespoonful every two hours. (In heartburn.)

℞ Magnesii carb., ... ℥ ss.
Testæ præpar., ... ℥ i.
Carbonis pulv., ... ℥ ij.
Pulv. calami, ... ℥ i.

M. et. ft. pulvis. S. Tooth powder.

MAGNESII CITRAS.

A pleasant tasting but not very soluble salt.

Internally employed in water, or better in lemonade, as a pleasant, mild laxative, especially for lying-in women.

Magnesii Citras Granulatus.—Composed of : citrate of magnesium, 11 parts; citric acid, 48 parts; bicarbonate of sodium, 37 parts; and sugar, 8 parts. Occurs in the form of coarse white granular masses which, added to water, are dissolved, with the formation of carbonic acid in large quantity, and form a pleasant acid fluid.

Internally employed in doses of a teaspoonful to a tablespoonful, dissolved in water, several times a day, as an agreeable laxative in catarrh of the stomach, or in small quantities as a refreshing beverage.

MAGNESII LACTAS.

Given in doses of gr. viij.–xxx. several times a day, or in a single dose of ʒ iiss.–iij., in powder or solution, as a laxative.

MAGNESII SALICYLAS.

Recommended in typhoid fever in doses of ʒ ss.–iss. per day, and as a laxative in doses of ʒ iss.–ij.

MAGNESII SULPHAS.

Epsom salt. *Internally* employed in doses of one to two tablespoonfuls (℥ ss.–i.) alone in water or as an ingredient of laxative mixtures. It is contained in natural bitter waters, such as Friedrichshall, Püllna, Hunyadi János, etc.

℞ Magnesii sulphatis, ... ʒ xij.
Sodii bicarbonatis, ... ʒ ij.
Acidi tartarici, ... ʒ iss.
M. S. One or two teaspoonfuls in a glass of water at night. (A laxative powder.)

℞ Magnesii sulphatis, ... ʒ v.
Sodii sulphatis, ... ʒ iiss.
Sodii bicarbonatis, ... gr. xlv.
Acidi tartarici, ... gr. xxx.
M. S. To be taken dissolved in a half-pint of water. (Laxative.)

Magnesii Sulphas Exsiccatus.—The preceding with the water of crystallization driven out. It is given internally in three-quarters the dose of the ordinary sulphate.

MAÏDIS STIGMATA.

Corn-silk. Internally recommended in decoction (℥ iss.–iv. in ℥ iij.), or in a fluid extract (Extractum Maidis Fluidum) in doses of 10 to 20 drops several times a day, up to ʒ i. pro die, in hot water, as a remedy for vesical catarrh, renal colic, gravel, etc. It is also said to possess an action similar to that of ergot.

MANGANI SULPHAS.

Internally employed in doses of gr. iss.–viij. three or four times a day, or in larger doses of ʒ ss.–i. taken in divided portions within a few hours (which, however, ordinarily causes vomiting or bilious stools), in solution, powder, or pills, as a remedy in chlorosis and jaundice.

Externally applied in ointment (1 part to 5 or 10) as a resolvent in stiff joints following gout or rheumatism, in contusions, neuralgias, and scrofulous bone tumors.

MANNA.

The concrete exudation of Fraxinus ornus, containing Mannit.

Internally employed to relieve irritation in doses of ʒ i.–iiss. several times a day, and as a laxative in doses of ℥ ss.–ij. (children ʒ iss.–vi.) in divided doses, in solution or electuary. For children it may also be given in boiled milk.

Syrupus Mannæ.—Given in doses of three or four teaspoonfuls for children.

℞ Mannæ, ... ℥ iss.
Aq. font., ... ℥ v.
Sodii tartr., ... ℥ i.
Elæosacch. limonis, ... ʒ v.
M. S. A tablespoonful every hour, as a laxative for adults.

℞ Mannæ, ... ℥ ss.
Aq. fœnic., ... ℥ iss.
Liq. ammon. anisati, ... ♏ xij.
M. S. Two teaspoonfuls every hour. (A mildly laxative expectorant for children.)

MATICO.

Internally employed in doses of gr. viij.–xxx. several times a day in powder or electuary; also in infusion (℥ iiss.–℥ i. in ℥ iij. water) for hemorrhages, and more frequently for gonorrhœa.

Externally in infusion as an injection for the urethra or vagina.

Oleum Matico.—Dose: ½ to 1 drop several times a day.

Extractum Matico.—Dose: gr. xv. in capsules three times a day.

Extractum Matico Fluidum.—Dose: ℥ ss.–i. three times a day. These three preparations are employed to meet the same indications as the crude drug.

MELISSA.

An aromatic carminative. Is employed like peppermint, and may be given in infusion (℥ i.–iv. in ℥ v., with ♏ xv.–xxx. of laudanum) in doses of a tablespoonful in diarrhœa and cholera nostras.

Spiritus Melissæ Compositus.—(Melissa flowers, 14 parts; orange peel, 12; nutmeg, 6; cinnamon and clove, each 3; alcohol, 150; and water, 250.)

Internally given in doses of 20 to 60 drops as a nervine, antispasmodic (in colic), and carminative.

Externally used as a derivative.

MENTHA PIPERITA.

Peppermint. (Mentha crispa, crisped mint, is employed in Europe in place of the Mentha viridis, spearmint, of the U. S. Pharmacopœia. It is less active and less pleasant-tasting than peppermint.)

Employed as an aromatic carminative in cardialgia, flatulent colic, and diarrhœa, usually in an extemporaneously prepared tea (often with tincture of opium), and by enema. Externally used in aromatic compresses.

Oleum Menthæ Piperitæ.—*Internally* employed as an ingredient of aromatic mixtures and tinctures; as a corrective of bad-tasting remedies; in oil-sugars, etc.

Externally applied by rubbing for the relief of headache (so-called "Chinese remedy").

Aqua Menthæ Piperitæ.—A frequently used vehicle.

Spiritus Menthæ Piperitæ.—Essence of peppermint. One part oil of peppermint in nine parts alcohol.

Mentholum.—Peppermint camphor, the principal ingredient of oil of peppermint. An antineuralgic and local anæsthetic. It is more commonly used in combination with chloral, camphor, thymol, benzoic acid, etc.

Internally employed in doses of gr. iij.–viij. six times a day, on account of its burning taste only in wafers or pills, in many forms of gastric and intestinal catarrh, and in abnormal fermentation occurring in the stomach or intestines; in cardialgia, colicky pains, vomiting, especially in gall stones (see formulæ), as an antispasmodic and sedative. It has also been recommended as a microbicide in cholera, and lately in pulmonary and laryngeal tuberculosis, in the latter case in the form of injection into the larynx (menthol 1 part, to olive oil 10 parts).

Externally employed in alcoholic solution, ointment, liniment, or in twenty-per-cent oily solution in furunculosis of the external ear; also in gelatin rods for introduction into the nasal cavities; and in the form of menthol cones, rubbed over the painful parts several times a day, for the relief of facial neuralgia and migraine. Its action in this case is enhanced if mixed with thymol or camphor, or in the form of benzoated menthol. It is used for pruritus, the parts being gently dabbed with a cloth dipped in a solution of menthol gr. xx.–xxx. in alcohol or olive oil ʒ xij., to relieve vulvo-vaginismus of young married women (see formula), and as a snuff for coryza (see formula).

℞ Mentholi, ... gr. xv.
Ext. valerianæ,
Ext. belladonnæ, ... āā ʒ ss.
Vaselini, ... ʒ i.

M. et ft. unguentum. Pledgets of lint of successively increasing diameter are smeared with the ointment and introduced into the vagina. (Vulvo-vaginismus of newly married women.)

℞ Mentholi, ... gr. iij.
(Cocain. hydrochlor., ... gr. iss.)
Caffeæ tostæ,
Sacch. albi, ... āā gr. lxxv.
M. et ft. pulvis. S. Catarrh snuff.

℞ Mentholi, ... gr. xv.
Ol. olivæ, ... ʒ vi.
Spt. vini gall., ... ʒ v.
Vitell. ovi, ... No. ij.
M. S. To be taken in two portions in the course of an hour, in gall stones. For the after-treatment, salicylate of sodium should be given, and also high rectal injections.

℞ Mentholi, ... ʒ ss.
Sacch. albi,
Acaciæ, ... āā gr. xv.
Ung. glycerini, ... q.s.
M. et ft. pil. No. 20. Each pill contains gr. iss. of menthol.

℞ Mentholi, ... gr. xv.
Alcohol., ... ʒ v.
Syr. simpl., ... ʒ i.
M. S. A teaspoonful every hour. (Vomiting of pregnancy.)

℞ Mentholi, ... ʒ ss.
Ol. olivæ, ... ♏ xv.
Lanolini, ... ʒ ij.
M. et ft. unguentum. S. For external use in migraine.

℞ Mentholi, ... ʒ i.
Ol. olivæ,
Liq. calcis, ... āā ʒ i.
M. et ft. linimentum. S. For burns.

METHACETINUM.

Recommended as an antipyretic for children, in doses of gr. iij.–v. in powder several times a day; but it has not yet been tried sufficiently to determine its value.

METHYLACETANILID.

See Exalginum.

METHYLALUM.

Hypnotic and sedative. A colorless fluid, with an odor like chloroform, soluble in water and alcohol.

Internally employed as a hypnotic in doses of ♏ xv.—xlv. in ℥ v. water.

Subcutaneously in doses of ♏ xv. of a ten-per-cent aqueous solution in delirium tremens.

It produces general anæsthesia when inhaled in the quantity of ℥ iss.–ij. in solution.

Externally employed to relieve pain, in ointment or liniment (ʒ i.–iiss. to ℥ i.).

It has also been recommended by subcutaneous injection as an antidote in strychnine-poisoning.

METHYLENI BICHLORIDUM.

Methylene has been employed as an anæsthetic by inhalation, like chloroform, but it is more volatile than the latter, and also more expensive. The narcosis so produced is said to be without the stage of excitement seen when chloroform is used, and the substance is effective in about half the quantity.

MOLLINUM.

A soft soap (caustic potash, forty parts; fat, one hundred parts; glycerin, thirty parts). It is a good base for mercurial, iodine, and iodide of potassium ointments.

MORPHINA.

See Opium.

MORRHUOLUM.

See Oleum Morrhuæ.

MOSCHUS.

Stimulant nervine, antispasmodic, restorative.

Internally employed in doses of gr. ⅛—iss. for children under one year, gr. iss.–viij. for adults, in powder mixed with sugar, and in emulsion—

1. In collapse in diseases of the most varied sort, but may be replaced by alcoholic stimulants, ether, or camphor, etc.

2. In convulsive affections in children, especially laryngismus, and in hysterical convulsions, but possesses no particular advantage over asafœtida and valerian.

Tinctura Moschi.—(Ten parts of musk in 45 each of alcohol and water.)

Internally employed in doses of ♏ xx.–lx. every two or three hours; also subcutaneously in half the amounts for the same purposes as musk itself.

℞ Moschi,
Camphoræ, ... āā gr. iiss.–viij.
Sacch. albi, ... ʒ ss.
M. et div. in chart. No. 5. S. One powder every two hours. (Restorative.)

℞ Moschi, ... gr. iij.
Acaciæ, ... ʒ ss.
Aq. fœnic.,
Syr. simpl., ... āā ʒ i.
Liq. ammon. anisat., ... ♏ xv.
M. S. A teaspoonful every hour or hour and a half. (For convulsions in a child of about six months.)

MUCILAGINOSA.

Gums are precipitated from watery solutions by alcohol, and are converted by the mineral acids, and partially also by the digestive fluids, into grape sugar; as such, and also directly, they are absorbed and thus possess some nutritive value (in fevers). They are employed therapeutically as a protective in diarrhœas, acute inflammatory conditions of the digestive and urinary tracts and of the larynx, and as a vehicle for irritant drugs.

Among the mucilaginous drugs are: acacia, tragacanth, salep, althæa, flaxseed, malva, mullein, carrageen, etc.

MYRISTICA.

Nutmeg is an aromatic, but is seldom employed medicinally in the form of the crude drug.

Oleum Myristicæ.—*Externally* employed in irritant salves, liniments, and plasters, especially in gastric troubles.

Balsamum Myristicæ.—Composed of yellow wax, 1 part;

olive oil, 2 parts; and oil of nutmeg, 6 parts. Employed like the oil.

Macis.—The seed-coat of Myristica fragrans. Given in doses of gr. iij.–viij., in powders or pills, as an aromatic corrigens. It is a constituent of several medicinal preparations.

Oleum Macidis.—A volatile oil derived from mace.

Internally employed in doses of 1 or 2 drops several times a day in ethereal solution, emulsion, or oil-sugar as a stomachic or aromatic corrigens.

Externally applied on cotton to the cavity of an aching tooth.

MYRRHA.

Internally employed in doses of gr. iss.–xv. several times a day in powders, pills, mixtures, and electuaries, as an expectorant in bronchorrhœa, especially with phthisis. It is given also, like the resins in general, as an emmenagogue.

Externally used in tooth powders, mouth washes, and gargles, and also as a mildly stimulating application to sluggish ulcers.

Tinctura Myrrhæ.—Used more especially as a dentifrice and mouth-wash. The addition of water precipitates the myrrh.

℞ Myrrhæ,	. . . . .	ʒ ss.
Acaciæ,	. . . . .	ʒ ij.
Tere cum		
Aq. anisi,	. . . . .	℥ v.
Ammon. chloridi,		
Ext. glycyrrhizæ,	. . . . .	āā ʒ i.
Syr. tolutan.,	. . . . .	℥ ss.

M. S. A tablespoonful every two or three hours. (Expectorant.)

℞ Myrrhæ,	. . . . .	ʒ iij.
Sacch. albi,	. . . . .	℥ ij.

M. et ft. pulvis. S. A teaspoonful four times a day. (Bronchorrhœa.)

℞ Tinct. myrrhæ,		
Spt. cochleariæ,	. . . . .	āā ℥ i.
Infus. salviæ,	. . . . .	℥ ij.

M. S. Mouth wash.

MYRTOLUM.

Obtained from myrtle oil.

Internally recommended in doses of one or two capsules, containing each ♏ ij., in putrid affections of the lungs.

NAPHTHALINUM.

Colorless, shining, crystalline scales obtained from coal tar, having a penetrating odor (masked by oil of bergamot, 1 part to 40) and a burning aromatic taste; insoluble in water, soluble in ether, chloroform, and hot alcohol.

Internally employed in doses of gr. iss.–viij. (maximum dose, gr. xv., or gr. lxxv. a day), in powder or pill, in intestinal catarrh, cholera infantum, and as an intestinal disinfectant in typhoid fever; recommended in doses of gr. iss.–v. twice a day for tape-worm and lumbricoids in children, gr. viij.–xlv. for adults, in powder with milk sugar. Large doses of naphthalin are said to produce cataract.

Externally applied in powder or mixed with oil or vaselin (1 part to 10) for scabies, favus, herpes tonsurans, eczema marginatum; and dissolved in the proportion of gr. xv.–xlv. in ℥ iss.–iij. of boiling water and added to one or two pints of warm infusion of althæa, for high rectal injections in diarrhœa of mycotic origin. It is also a good preservative for clothing, stuffed animals, etc. As a protection against moths the naphthalin scales are best used.

Naphthalini Monobromas.—*Internally* employed in doses of gr. ⅓ to ij. several times a day in solution or pills for spasmodic cough, bronchitis, and articular rheumatism.

Externally used like naphthalin, which is to be preferred.

℞ Naphthalini, ... gr. xv.
Elæosacch. menth. pip., ... ʒ i.
M. et div. in chart. No. 10. S. One powder every three hours. (Intestinal catarrh.)

℞ Naphthalini, ... ʒ ss.
Ergotæ, ... ʒ i.
M. et div. in chart. No. 8. S. One powder in a wafer every two hours. (Dysentery with hemorrhage.)

NAPHTHOLUM.

(Recrystallized iso- or beta-naphthol.) This is, like naphthalin, a coal-tar product, and resembles it in appearance and solubility without its unpleasant odor or its property of staining the linen.

Externally employed as a substitute for tar in various skin diseases, applied in oil, lard, or lanolin in five-per-cent strength for prurigo, in one-per-cent strength for chronic (squamous) eczema, and various forms of acne (red nose), and as a paste (see formulæ) for psoriasis, seborrhœa, sycosis, and scabies. A twelve-per-cent alkaline solution is employed to wash out the nose (in quantities of a teaspoonful) in ozæna. Care must be exercised in regard to the strength of naphthol applications, as their long use is apt to give rise to toxic symptoms, such as hæmoglobinuria, nephritis, vomiting, loss of consciousness, convulsions, etc.

℞ Naphtholi, ... ʒ ss.
Glycerini, ... ʒ i.
Alcohol. dil. . . . . ℥ iij.

M. S. For painting on the skin twice a day in psoriasis, and as an application in bromidrosis of the feet and axillæ, starch powder being subsequently applied, or pledgets of cotton inserted between the toes.

℞ Naphtholi, ... ℥ ss.
Adipis, ... ℥ iij.
Sapon. viridis, ... ℥ iss.
Cretæ albæ, ... ʒ iiss.

M. et ft. unguentum. S. To be applied once or twice a day in scabies; followed by a dusting with starch, woollen clothing being worn, and finally a bath.

℞ Naphtholi, ... ʒ iiss.
Sulphur. præcip., ... ℥ iss.
Vaselini flavi (or lanolin),
Sapon. viridis, ... āā ʒ vi.

M. et leviter terendo ft. pasta. S. For acne. The paste is to be applied every one to three days for twenty minutes, then washed off and the parts dusted with powdered talc. A zinc-starch ointment should be applied at night.

℞ Naphtholi, ... gr. viij.–xv.
Adipis, ... gr. xv.
Lanolini, ... ʒ ij.
M. et ft. unguentum. S. For external use, in acne.

Naphtholum Camphoratum.—A syrupy fluid, employed in parenchymatous injection (♏ ij. in ʒ iiss. olive oil) for pulmonary tuberculosis. It is also recommended for external use in furunculosis, sore throat, and coryza.

NARCEINA.

Narceinæ Hydrochloras.—Sedative and hypnotic.

Internally employed in doses of gr. $\frac{1}{6}$ to i. in powder, pill, or solution (with the addition of a few drops of hydrochloric acid) as a substitute for opium (the disagreeable after-effects of which it is said not to possess) in whooping-cough and bronchitis. In doses of gr. $\frac{1}{6}$ to $\frac{1}{4}$ for children of three or four years, it produces sleep and prevents the night attacks of coughing.

Subcutaneously employed in the same or larger doses than morphine in spasmodic affections and neuralgia. It may also be given by enema or suppository in doses of gr. $\frac{1}{6}$ to i.

NITROGLYCERINUM.

The action of nitroglycerin resembles that of nitrite of amyl and nitrite of sodium, but it is much more intense and persistent, and varies greatly in different individuals. In small doses it increases the rapidity of the pulse, flushes the face, and causes headache, photophobia, tinnitus aurium, nausea, vomiting, and colic; large doses produce paralytic symptoms, dyspnœa, collapse, bloody urine, and glycosuria. For this reason, and also because the substance is very explosible, great caution is necessary.

Internally employed in doses of gtt. $\frac{1}{100}$ gradually increased (it is most safely administered in doses of 1 drop of a one-per-cent solution in alcohol or almond oil, gradually increased to 5 or even 10 drops a day, and may also be given in tablets of gr. $\frac{1}{100}$ each) in angina pectoris, bronchial, nervous, or uræmic asthma, and in chronic nephritis.

It may also be administered in the dose of 20 to 30 drops of a 1:1,000 solution.

NUTRIENTIA.

The nutritive value of the different artificial foods depends upon the proportions of albumin, fat, carbohydrates, and peptones which they contain. These proportions vary greatly in the different foods for children and invalids in the market. The amount of albumin in some of the articles used as food or delicacies is here given (*conf.* Caro).

Caviar	25.81%	Black bread (German)	4.20%
Almonds	24.18	Cow's milk	4.00
Yolk of egg	13.01	Mashed potatoes with milk	3.10
White of egg	13.48	Potatoes	2.00
Wheat flour	13.06	Cauliflower and asparagus	2.00–3.00
Rye flour	12.50	Sago	0.50
Oatmeal	11.20	Malt extracts	0.28–2.50
Rice	7.80	Condensed milk	8.79
Cocoa	4.16–8.23		
Oysters	4.95		
White bread	7.20		

NUX VOMICA.

The seed of Strychnos nux vomica.

Internally employed in dose of gr. ss. (maximum gr. iss., or gr. iij. a day) in powder, but it is seldom given in this form.

Extractum Nucis Vomicæ.—Given in doses of gr. $\frac{1}{12}$ several times a day up to gr. ss., or gr. ij. a day, in powder or pill, in atony of the digestive tract, in chronic diarrhœa, and in cholera, and also for the same indications as strychnine.

Extractum Nucis Vomicæ Fluidum.—Dose: ♏ ij.–v., given for the same purposes as the preceding, alone or in mixtures.

Tinctura Nucis Vomicæ.—Given in doses of 5 to 20 drops several times a day, up to the maximum dose of ♏ xv., or ʒ ss. a day, for the same purposes as the extract, but used especially as a stomachic tonic.

Strychninæ Nitras.—Colorless needle-shaped crystals, of a very bitter taste, soluble in 90 parts of cold and 6 parts of boiling water, and in 70 part of cold and 5 parts of boiling alcohol.

Internally (and subcutaneously) given in doses of gr. $\frac{1}{60}$ up to the maximum of gr. $\frac{1}{6}$, or gr. $\frac{1}{3}$ per day, in powder, pill, or solution. For long administration it should be given in

initial doses of gr. $\frac{1}{60}$ and increased each day by gr. $\frac{1}{60}$ until a dose of gr. $\frac{1}{6}$ is reached, in which amount it is to be given for five or six days, and then stopped for ten to twelve days.

1. In amblyopia and amaurosis unassociated with anatomical changes, or even when there is partial atrophy of the optic nerve (here by subcutaneous injection).

2. In motor paralyses, spinal paralysis, paresis.

3. In peripheral paralyses, bladder disturbances, vesical paralysis, enuresis.

4. In digestive disturbances, loss of appetite, diarrhœa, and also in habitual constipation due to inefficient peristalsis.

5. In dipsomania and delirium tremens (by the mouth and subcutaneously).

Symptoms of Poisoning.—First stiffness, then tremor and general restlessness in the entire body, extreme impressionability of the organs of sense, tetanic symptoms, extreme anxiety, and dyspnœa even to apnœa, and complete collapse.

Treatment of Strychnine Poisoning.—Emptying of the stomach, the administration of tannin, chloral alone or combined with bromide of potassium in the proportion of ʒ i. chloral and ℈ ss. bromide, to be taken at once, then ℈ ss. more of the bromide, and within the next twenty-four hours ℥ i. more in divided doses; morphine, curare, and artificial respiration.

℞ Strych. nitrat., ... gr. i.
Aq. fervid., ... q.s.
ad solutionem.
Ext. glycyrrhizæ,
Pulv. glycyrrhizæ, ... āā ʒ ss.

M. et ft. pil. No. 30. S. Beginning with two pills a day gradually increasing to six, eight, and ten. (Hysterical, laryngeal, and peripheral spinal paralysis, delirium tremens.)

℞ Ext. nucis vomicæ, ... gr. $\frac{1}{6}$.
Bismuthi subnitratis,
Magnesii carbonatis, ... āā ʒ ss.
Sacch. albi, ... ʒ i.
Ol. menth. pip., ... gtt. x.

M. et div. in chart. No. 10. S. One powder every two hours. (Gastralgia.)

℞ Ext. nucis vomicæ,
Ext. cannabis indicæ, . . . āā gr. viij.
Ergotini, ... ʒ ss.
M. et ft. pil. No. 20. S. One pill morning and evening. (Impotence.)

℞ Tinct. nucis vom., ... ʒ ss.
Aq. amygdal. amaræ, ... ʒ v.
M. S. Fifteen drops three times a day. (Chronic gastric catarrh.)

℞ Strych. nitratis, ... gr. i.
Aq. destillatæ, ... ʒ iiss.
M. S. Five drops twice a day, or two drops hypodermically, gradually increased. (Hysterical, laryngeal, and peripheral spinal paralyses and delirium tremens.)

℞ Ext. nucis vomicæ, ... g. iij.
Tinct. cantharidis, ... ʒ ss.
Tinct. calami, ... ʒ iss.
M. S. Ten to 15 drops in elder tea three times a day. (Vesical and rectal paralysis.)

℞ Tinct. nucis vom., ... ʒ ss.
Tinct. opii, ... ʒ i.
Tinct. valerianæ, ... ʒ iiss.
Ol. menth. pip., ... gtt. v.
M. S. Fifteen to 30 drops several times a day. (Russian cholera drops.)

℞ Tinct. nucis vom., ... ♏ xlv.
Tinct. rhei (or Tr. cinchonæ), . . . ℥ i.
M. S. Twenty to 30 drops three or four times a day. (Dyspepsia, alcoholism.)

OIL-SUGARS.

See Elæosacchara.

OLEUM MORRHUÆ.

A nutrient in scrofula, rachitis, phthisis, etc. An oil obtained from the fresh liver of Gadus morrhua (cod-fish).

Internally given in doses of one to three teaspoonfuls a day for children, one to three tablespoonfuls for adults. It is best taken pure, for children soon learn to take it readily

enough in that way, and adults may disguise the flavor by taking first a little peppermint, vinegar, lemon juice, or oil of anise on the tongue, or by adding rum or arrack to the oil. The digestibility of the oil is increased by the addition of oil of peppermint (1 drop to 5 teasponfuls) or a few drops of ether, and by taking the oil after meals. An even better way is to make an odorless and tasteless emulsion with equal parts of lime water and a little syrup, the lime being also useful as a medicament.

Contra-indications to the use of cod-liver oil are: fever, a tendency to diarrhœa, the first half-year of life, the hot season of the year, and individual idiosyncrasy.

Various preparations of cod-liver oil, containing iodine, iron, and other substances, are made.

Morrhuolum.—Alleged to be the active medicinal and nutritive principle of the oil remaining after the removal of the fat. It is given for the indications of cod-liver oil, in capsules of gr. iij. each (representing a teaspoonful of the oil), in doses of two to four capsules per day for children, and four to eight for adults.

OLEUM RICINI.

Castor oil is a cathartic of certain action, which, however, if long used disorders the digestion. A dose of ʒ i. is apt to cause vomiting.

Internally given in doses of one-half to two tablespoonfuls, repeated if necessary in two hours, in a warmed spoon, in black coffee or hot broth or milk, or with the taste disguised by peppermint drops before and after taking. For children the oil may be mixed with enough granulated sugar to make a paste. The addition of a drop of croton oil makes the action more powerful, but not more sure. It may also be given in capsules or emulsion. Castor oil may be administered even when inflammatory affections of the intestine are present.

Externally it is recommended to be applied repeatedly to excoriated nipples.

When given by enema, the dose is one to four tablespoonfuls.

℞ Ol. ricini,

Pulv. glycyrrh. comp., . . . āā ʒ v.

M. et ft. electuarium. S. To be given in teaspoonful doses; it may also be inclosed in wafers.

℞ Ol. ricini, ... ℥ i.
Acaciæ, ... ℥ ss.
Aq. destill., ... ℥ v.
Syr. menthæ pip., ... ℥ ss.

M. et ft. emulsio. S. A tablespoonful every one or two hours until the bowels move.

OLEUM SANTALI.

Sandalwood oil is employed in doses of 10 to 20 drops several times a day in gonorrhœa and bronchitis.

OLEUM TEREBINTHINÆ.

See Terebinthina.

OLEUM TIGLII.

Croton oil (expressed from the seed of Croton Tiglium) is a powerful drastic cathartic which causes a raw sensation in the throat, but seldom produces colic.

Internally employed in doses of ¼ to 1 drop, mixed with a powder or in castor oil, in very obstinate constipation, but its administration should never be long continued. It is also used in ileus from mechanical causes (but with care; *conf.* Opium) in order to provoke energetic peristaltic movements. It is efficient also when given by the rectum in doses of gtt. i.–iij. in emulsion.

Externally, croton oil is a powerful counter-irritant (producing a vesiculo-pustular eruption) applied in liniment with oil or glycerin.

℞ Ol. tiglii, ... gtt. ij.
Ol. ricini, ... ℥ ij.

M. S. One tablespoonful every hour until the bowels act. (Obstinate constipation, lead colic, ileus.)

℞ Ol. tiglii, ... gtt. i.–iij.
Ol. olivæ, ... ℥ i.
Acaciæ, ... ℥ ss.
Aq. fontan., ... ℥ iv.

M. et ft. emulsio, cui adde
Extr. hyoscyami, ... gr. v.–x.

S. To be given in enema when croton oil is not well borne by the stomach.

℞ Ol. tiglii, ... gtt. i.
Hydrarg. chlor. mitis, ... gr. viij.
Sacch. lactis, ... 3 ss.
M. et div. in chart. No. 5. S. One powder every hour until the bowels move freely.

℞ Ol. tiglii, ... ♏ xv.
Ol. terebinth., ... ♏ lxxv.
M. S. Applied to the skin to excite a derivative eruption, in sciatica, etc.

A better application for this purpose, since its action can be distinctly localized, is a mixture of equal parts of croton oil and flexible collodion.

OPIUM.

Opium and its alkaloids, the most important of which are morphine and codeine, are hypnotic and analgesic, depressing the activity of the brain and the reflex excitability of the spinal cord. In this respect the action of opium and of morphine is the same, but when the latter is used the dosage can be regulated much more exactly. Where a general narcotic effect is desired, morphine is to be preferred.

Indications for Opium.—1. Diarrhœas of all kinds, with or without colic, in powders (pulvis ipecac. et opii—Dover's powder) or in tinctures, often combined with astringents.

2. Sporadic or epidemic dysentery, cholera nostras, and epidemic cholera, but in the last-named only in the first stages (morphine subcutaneously is used for the relief of the cramps in the legs).

3. Peritonitis, to quiet the peristaltic action, and lead colic.

4. Intestinal hemorrhages, from the upper portions of the gut, and in acute intestinal obstruction, ileus.

Indications for Morphine.—1. Sleeplessness (here only occasionally surpassed by chloral) and pain from the most varied causes. Best given in the evening in initial doses of gr. $\frac{1}{12}$.

2. Mental diseases accompanied by excitement and restlessness; maniacal, hysterical, and puerperal psychic disturbances; and hyperæsthesia with increased reflex excitability. In these cases (in which not infrequently chloral will be found to be preferable) the drug is best administered in subcutane-

ous injection in large doses (gr. $\frac{1}{3}$–$\frac{2}{3}$), as small doses often serve only to increase the restlessness.

3. The so-called delirium from inanition (combined with stimulants) in pneumonia, erysipelas, etc., after the crisis; typhoid delirium accompanied by great nervous excitability and insomnia; and delirium tremens, without fever, in infrequent large doses. But in the latter case opium is said to act better than its alkaloid.

4. Rheumatism, sciatica, gastralgia (with bitter-almond water, belladonna, and bismuth), enteralgia, and colic, especially lead, biliary, or renal.

5. Neuralgia (subcutaneously employed), spasmodic affections (especially when reflex from irritation of the sensory nerves), tetanus, severe labor pains (in large doses by enema, and in especially severe cases by hypodermic injection in the sacral region), and in puerperal eclampsia (subcutaneously).

6. Diseases of the respiratory organs, especially when there is dry, irritable cough accompanied by slight hemorrhages.

7. Vomiting (here in small doses) due to ulcer or cancer of the stomach, or the abuse of alcohol; or the so-called sympathetic vomiting occurring in affections of some other of the abdominal viscera, the stomach being normal.

Untoward incidental effects of the opiates in general (which may be partially helped by cold compresses to the head) are: vertigo, headache, vomiting, itching of the integument, constipation, retention of urine, and sometimes an urticaria-like eruption.

Contra-indications.—Infancy up to three years of age (the most minute dose may cause collapse in nursing infants) as well as old age; marked adynamia, especially in diseases of the respiratory organs; hyperæmia of the brain; marked anorexia and fermentative changes in the intestinal canal.

Opium.—Powdered opium is given in that form or in pill, in doses of gr. $\frac{1}{6}$–iss. (maximum dose, gr. ij., or gr. viij. a day), but much larger amounts may be exhibited under special circumstances. In suppositories the dose is gr. i.–iss.; it is employed in this form in tenesmus, strangury, spasmodic labor pains, etc.

Extractum Opii.—*Internally* employed like opium but in about one-half the dose; and may also be given in enema and in rectal or vaginal suppository.

Pulvis Ipecacuanhæ et Opii.—Dover's powder, composed of opium and ipecac, each 10 parts, rubbed up with 80 parts of sugar of milk. It is given internally in doses of gr. iiss.–xv. several times a day, and is to be preferred when a constipating effect is aimed at.

Tinctura Opii.—Laudanum contains the soluble portion of 10 parts of opium in 100 of tincture. It may be given in doses of 5 to 20 drops several times a day. One drop corresponds to about gr. $\frac{1}{12}$ of opium, or 20 drops to a grain and a half. Maximum dose, ℥ xxiv., or ℥ lxxv. a day.

Tinctura Opii Crocata.—Sydenham's laudanum contains the soluble portion of 15 parts of opium, 5 parts of saffron, and 1 part each of clove and cinnamon in 75 parts each of alcohol and water. It is employed in the same dose as the preceding, but is pleasanter to take. It is sometimes dropped into the eye in cases of scrofulous conjunctivitis with photophobia and corneal opacity.

Tinctura Opii Camphorata.—Paregoric is made by macerating 4 parts each of opium, benzoic acid, camphor, and oil of anise in 40 of glycerin and enough diluted alcohol to make 1,000 parts. It is given in doses of 5 to 20 drops for children, ʒ ss.–i. for adults, pure or in a mixture with syrup two or three times a day.

Syrupus Opiatus.—Contains gr. $\frac{1}{12}$ extract of opium in a teaspoonful, and is preferable to the following.

Syrupus Papaveris.—This is officinal in the German Pharmacopœia, but is an uncertain "soothing syrup." It, or preferably the preceding, is given in dose of a teaspoonful to children, either pure as a feeble narcotic or as a constituent of quieting mixtures.

Emplastrum Opii.—Contains opium in the proportion of 6 parts in 100.

Pilulæ Odontalgicæ.—Composed of opium, pyrethrum, oil of cajeput, oil of clove, and belladonna.

Morphina.—The officinal salts of morphine are the acetate, hydrochlorate, and sulphate, and in addition to these the hydrobromate, the lactate, and the valerianate are sometimes prescribed. They are given (the hydrochlorate is to be preferred) internally in doses of gr. $\frac{1}{12}$ to $\frac{1}{6}$ up to the maximum of gr. ss. (gr. iss. pro die). One-sixth of a grain of morphine is the equivalent, in hypnotic strength, of about 1

grain of opium (one centigram and one-half decigram respectively).

For subcutaneous injection a solution may be made of morphine, gr. iss., in ♏ lxxv. each of water and water of bitter almond or glycerin; of which ♏ xv. contain gr. $\frac{1}{6}$ morphine. The addition of 1 part of a one-per-mil atropine solution to 5 parts of this morphine solution is said to obviate the tendency of the latter to cause vomiting. Morphine is also given in snuffs, enemas, and suppositories.

Codeina.—The pure alkaloid is used, or its salts, the sulphate and the phosphate.

Internally the phosphate is employed in doses of gr. $\frac{1}{12}$ to i. (maximum, gr. iss., or gr. iij. a day) in powder, pill, or solution for the same purposes as morphine; and is also recommended especially for diabetes, in double the above dose (see formula). *Subcutaneonsly* phosphate of codeine may be given in a solution of gr. viij. to ʒ iiss. of water with gr. $\frac{1}{6}$ of carbolic acid, in doses of ♏ xv.–xxx., to meet the same indications as morphine.

℞ Opii pulv., ... gr. v.–xv.
Acidi tannici, ... gr. xv.–xxx.
Sacch. lactis, ... ʒ i.

M. et div. in chart. No. 10. S. One powder every two or three hours. (Powders for diarrhœa—to be carried when travelling.)

℞ Extr. opii, ... gr. iss.–iij.
Aq. fœniculi, ... ℥ i.
Elixir. glycyrrhizæ, ... ℥ iss.

M. S. A teaspoonful three or four times a day. (Bronchial catarrh.)

℞ Opii, ... gr. iss.
Antimonii pentasulphidi, ... gr. viij.
Sacchari albi, ... ʒ i.

M. et div. in chart. No. 10. S. One powder every two or three hours. (Bronchial catarrh, asthma, emphysema.)

℞ Extr. opii, ... gr. viij.–xij.
(or Morph. hydrochlor., . . . gr. i.–ij.)
Ol. theobromæ, ... ℥ ss.–i.

M. et ft. suppos. No. 5. S. For rectal or vaginal use in spasmodic cough or painful affections of the intestines, bladder, or female genital organs.

℞ Tinct. opii camph., ... ʒ i.
Syr. althææ, ... ʒ x.
M. S. A teaspoonful (containing gr. ⅓ opium) every three hours. For older children with severe bronchial catarrh.

℞ Tinct. opii, ... gtt. v.–x.
Acidi tannici, ... gr. iv.–viij.
Aq. destillatæ, ... ℥ iij.
Vini tocayensis, ... ʒ v.
M. S. A dessertspoonful every two or three hours. (Diarrhœa of children.)

℞ Codeinæ phosphatis, ... gr. viij.
Pulv. gentianæ, ... ʒ ss.
Extr. gentianæ, ... q.s.
M. et ft. pil. No. 50. S. Two pills three times a day. (Diabetes.)

℞ Morph. hydrochlor., ... gr. ij.
Aq. amygdal. amaræ, ... ℥ ss.
M. S. Fifteen to 20 drops three or four times a day (20 drops = ⅙ grain morphine), alone or in an expectorant mixture, for the relief of dry, irritable, and spasmodic coughs, or colicky and other forms of pain.

℞ Tr. pii, ... ʒ i.
Tr. castor., ... ʒ iss.
Tr. valerian., ... ʒ iij.
M. S. Ten to 20 drops three or four times a day. (For hysterical pains, colic.)

℞ Tinct. opii, ... ♏ lxxv.
Tinct. nucis vom., ... ♏ xv.
Tinct. valerianæ, ... ʒ iiss.
Ol. menth. pip., ... gtt. iij.
M. S. Twenty-five to 30 drops every hour or two, alone or in peppermint water. (Russian cholera drops.)

℞ Morph. hydrochlor., ... gr. ss.
Acidi acetici, ... gtt. x.
Aq. amygdal. amaræ, ... gtt. lxxv.
Ac. hydrocyan. dil., ... gtt. x.
M. S. About 10 drops to be snuffed up the nostril on the painful side, for hemicrania.

OPODELDOC.

See Ammoniæ Aqua.

OREXYNUM HYDROCHLORICUM.

A derivative of quinolin. Used as a stomachic in anorexia not dependent upon actual disease of the stomach, in doses of gr. v.–viij. once or twice a day, in gelatin-coated pills because of its sharp burning taste. The best way is to give three pills (see formula) at once with a large cup of meat broth at about ten o'clock in the morning; if no effect is obtained, the dose may be increased to four or five pills; or three pills may be given morning and evening.

℞ Orexyni hydrochlor., ... 3 ss.
Ext. gentianæ,
Pulv. althææ, ... āā q.s.
M. et div. in pil. No. 20. S. From three to six pills a day.

PANNA.

The root of an African fern, possessing anthelmintic properties. From 120 to 150 grains are to be taken in the morning, fasting.

PANCREATINUM.

See Caro.

PAPAYOTINUM.

Derived from the juice of the unripe fruit of the Carica papaya or pawpaw. It is readily soluble in water and glycerin.

A five-per-cent solution will, within half an hour, soften fresh lean meat and soon reduce it to a thick turbid pap. The membrane of croup is said to be wholly dissolved by it in two hours.

Internally employed in doses of gr. i.–iss. in powder, pill, or five-per-cent solution in dyspeptic and catarrhal gastric affections; also as an anthelmintic.

Externally in five to ten per cent solution used for painting the pharynx in order to dissolve the diphtheritic membrane; and is blown in the form of powder, through a thin glass tube, into the larynx for the same purpose.

Subcutaneously employed in ten-per-cent solution to cause the resorption of enlarged glands and cancerous nodules.

PARAFFINUM.

Liquid vaselin is a clear oily fluid obtained from petroleum. It is used as an unchangeable constituent for soft ointments, liniments, etc., and as a vehicle for insoluble substances for subcutaneous injection.

Hard paraffin is a solid, white, odorless mass.

Unguentum Paraffini.—Composed of 1 part of hard and 3 of liquid paraffin, forms a very good base for ointments; not suitable, however, for salines and extracts.

PARALDEHYDUM.

Hypnotic. A clear colorless fluid, having an odor resembling that of chloroform and a peculiar disagreeable taste, soluble in alcohol and ether, and in 8½ parts of water. The indications are the same as for chloral, and the dose about half as much; it is said to cause a quiet, natural sleep without any unpleasant incidental or after effects.

Internally employed as a sedative in doses of ♏ xv.–xxx., as a hypnotic ♏ xxx. up to the maximum of ʒ i. (or ʒ iiss. per day in divided doses), in mixtures and occasionally in mucilage. The disagreeable taste is covered by rum, lemon juice, and oil of peppermint. It may also be given by the rectum in enema or suppository. It is an antidote to strychnine poisoning.

℞ Paraldehydi, ... ʒ i.–iss.
Aq. destillatæ, ... ℥ iiss.
Syr. menth. pip., ... ℥ ss.
M. S. Half the quantity at a dose. (Insomnia, poisoning by strychnine.)

℞ Paraldehydi, ... ʒ i.
Mucil. acaciæ,
Aq. destillatæ, ... āā ʒ vi.
M. S. For administration by the rectum.

PASTILLI.

See Trochisci.

PELLETIERINÆ SULPHAS.

See Granatum.

PEPO.

A remedy for tape-worm. From 160 to 200 fresh pumpkin seeds are deprived of their outer covering and rubbed up into a powder with sugar, and taken with copious draughts of milk or water in the morning, the patient having fasted for a day previously; then about noon of the same day a good dose of castor oil is taken.

On the continent of Europe the seeds of the Cucurbita maxima, Italian melon-pumpkin, are employed for the same purpose.

PEPSINUM.

German pepsin is a fine, nearly white, only slightly hygroscopic powder of a bread-like odor and sweetish taste. It forms with lactic and hydrochloric acids the digestive principle of the gastric juice, and is therefore theoretically recommended in the dyspepsia of anæmic persons and of the phthisical, in chronic gastric catarrh, and in the weak digestion of the aged.

Internally given in doses of gr. iij.–viij. in powder with sugar of milk, in pills or solution, shortly before and after each meal, 5 drops of dilute hydrochloric acid in water being taken after it.

Vinum Pepsini.—Contains: pepsin, 24 parts; glycerin, 20; hydrochloric acid, 3; water, 20; syrup, 92; tincture of bitter-orange peel, 2; and sherry wine, 839 parts. It is taken in doses of a tablespoonful before or after meals, and also in the indigestion of bottle-fed infants in doses of 15 to 20 drops, and in older scrofulous children a teaspoonful after each meal.

℞ Pepsini, ... gr. xv.
Ac. hydrochlor. dil., ... ♏ viij.
Aq. destillatæ, ... ℥ iv.
Syrup. simplicis, ... ℥ v.

M. S. A dessertspoonful to a tablespoonful four or five times a day after eating. (Dyspepsia.)

℞ Pepsini, ... 3 i.
Sacch. lactis, ... 3 iij.
M. et div. in chart. No. 16. S. One or two powders after each full meal, followed by a few drops of hydrochloric acid in water.

PEPTONUM CARNIS.

See Caro.

PEPTONUM SICCUM.

Various dry preparations (powder or extract form) made from the artificial digestion of pure albumen (white of egg or blood serum), which contains rather large quantities of hemi-albuminose in addition to peptone, and employed chiefly as nutrient enemas in doses of 3 iiss.–v.

PEPTONUM VEGETABILE.

It is employed in the nourishment of patients with gastric or intestinal trouble and of convalescents, and is prepared as follows: Eight ounces of fine pea flour, 15 grains of salicylic acid, and 8 grains of good pepsin are added to a quart of water and stirred often and thoroughly, allowed to stand in a warm place (not over 100° F.) for twenty-four hours, then strained, and slightly thickened with moderate heat. The soup thus prepared is rendered palatable by salt, spices, meat extracts, etc.

PETROLEUM CRUDUM.

Externally employed alone or mixed with oil or fat (1:10) as an application in frost-bites, rheumatism, paralysis, and scabies. (It produces a slight eczema.)

Æther Petrolei.—Employed like the preceding, and also occasionally by inhalation. In spray, often mixed with chloroform, it produces local anæsthesia.

℞ Petrolei,
Ol. lini, ... āā ℥ i.
Aq. ammon., ... ℥ ss.
M. S. For external use. (Frost-bites.)

℞ Camphoræ, ... gr. viij.
Petrolei, ... 3 i.
Cerati, ... 3 iv.
M. S. For chilblains.

Petrolatum.—Vaselin. A semi-solid fat-like substance, obtained by distillation from petroleum, of a pale yellow color, translucent, and without odor or taste. Used largely as a base for ointments.

PHENACETINUM.

Antipyretic, antineuralgic. (Para-acetphenetidin.) A derivative of anilin. Occurs in the form of colorless, shining crystalline scales without odor or taste, soluble in 16 parts of alcohol, but almost insoluble in water. (Fifteen grains of phenacetin equal in antipyretic effect about 8 grains of antifebrin or 30 grains of antipyrine.)

Internally employed as an antipyretic in doses of gr. iv.–x. (maximum dose, gr. xv., or gr. lxxv. a day) for adults, and gr. ij.–v. for children in powder at night; as an antineuralgic in single doses of gr. viij.–xv. in water or wine, in hemicrania and neuralgias of various sorts; in whooping-cough in doses of gr. i. four times a day for children in the first year, for those in the second year gr. iss. three times a day, and for older ones gr. iss. or more four times a day; in rheumatism in doses of gr. viij.–xv. three times a day. Disagreeable incidental effects from phenacetin have as yet not been reported.

Externally it is recommended for use as a good antiseptic dusting powder.

PHENOCOLLUM HYDROCHLORICUM.

A white powder, of a bitter saline taste, soluble in water.

It is recommended for use as an antipyretic and in rheumatism, and is said to produce absolutely no disagreeable incidental effects, not even sweating.

Internally employed in doses of gr. viij. a day divided into five portions, it is said to cause complete apyrexia in every case, and also in the same doses to exert a favorable influence upon painful rheumatic joint affections, in cases in which other remedies have failed. The remedy has not, however, as yet been sufficiently tried.

PHENOL.

See Acidum Carbolicum.

PHOSPHORUS.

Acts through the circulation as a stimulant to osseous tissue and favors its growth, without, when cautiously used, exerting any prejudicial effect on the organism.

Internally employed in doses of gr. $\frac{1}{300}$, gradually increased to the maximum of gr. $\frac{1}{60}$ (gr. $\frac{1}{12}$ per day) in pill or oily solution, not infrequently in combination with cod-liver oil. A teaspoonful of cod-liver oil, containing grain of phosphorus in 4 ounces, is given morning and evening in rickets and osteomalacia.

In the use of phosphorus the initial doses should be very small and then gradually and cautiously increased, for in the beginning a profuse diarrhœa is liable to set in, which, however, soon disappears, not again to return.

Phosphorus, when too long continued, causes fatty degeneration of the liver and other toxic symptoms. The antidote in acute poisoning is turpentine, which see.

Externally applied in liniments or ointment (gr. i.–v. in ʒ vi.) for rheumatism, paralyses, and diseases of the spinal cord.

℞ Phosphori, ... gr. $\frac{1}{6}$.
Ol. amygdal., ... ʒ iiss.
Aq. destillat., ... ℥ iiiss.
Acaciæ, ... ʒ iiss.
M. et ft. emulsio. S. A teaspoonful a day.

℞ Phosphori pulv., ... gr. ss.
Syr. simplicis, ... ʒ ij.
Misce terendo et agitando, adde
Pulv. glycyrrhizæ, ... ʒ iiss.
Pulv. acaciæ, ... gr. lxxv.
Tragacanthæ, ... gr. xl.
M. et ft. pil. No. 250. S. From two to five pills twice a day.

PHYSOSTIGMA.

Calabar bean (Faba calabarica) is a nerve poison which paralyzes the brain and spinal cord, interferes with the conduction of voluntary impulses and with reflex action, and benumbs the sensation of pain. Through stimulation of the oculo-

motor it exerts a contrary effect upon the iris to belladonna. It also lowers the pulse rate and increases arterial tension by inducing contraction of the smooth muscular fibres, and, in the same way, increases peristaltic action. The bean itself is never used, but only preparations made from it.

Extractum Physostigmatis. — *Internally* employed in doses of $\frac{1}{12}$ to $\frac{1}{6}$ grain (maximum dose, $\frac{1}{3}$ gr., or 1 gr. per day) several times a day in solution, powder, or pills.

Externally used to drop into the eye, in a solution of 1 part in 30 glycerin.

Physostigminæ (Eserinæ) Salicylas.—(Sulphate of physostigmine or eserine is employed only in veterinary practice.)

The salicylate contains sixty-six per cent eserine and thirty-four per cent salicylic acid.

Internally employed in does of $\frac{1}{300}$ grain up to the maximum of $\frac{1}{64}$ gr. (or $\frac{1}{20}$ gr. per day) from one to three times a day, in powder, pills, or solution, in atony of the intestine, neuralgias, epilepsy, chorea, and other convulsive affections, in tetanus (either traumatic or of the new-born), in the night sweats of phthisis, and also as an antidote in strychnine and belladonna poisoning.

Externally, in a solution of 1:1,000 dropped into the eye in dilatation of the pupil and paralysis of accommodation (idiopathic, secondary to diphtheria, or from the action of atropine); to break up posterior synechia when the adhesions are chiefly marginal (to be used with care when inflammation is present); to diminish intra-ocular pressure in glaucoma and staphyloma totale; and as an antidote to the eye changes produced by atropine. For application to the eye the lamellæ of physostigmine (containing each $\frac{1}{1000}$ grain) are more commonly used.

Subcutaneously employed, to meet the same indications as the internal use, in a one-per-cent solution in doses of $\frac{1}{128}$ to $\frac{1}{64}$ gr., or $\frac{1}{20}$ gr. pro die.

℞ Extr. physostig., ... gr. i.
Glycerin. puriss., ... ʒ iiss.

M. S. Six drops every three hours in atony of the intestine, flatulence, etc.

℞ Physostigminæ salicyl., ... gr. $\frac{1}{3}$.
Aq. destillatæ, ... ʒ iiss.

M. S. For dropping into the eye in doses of 2 or 3 drops.

PHYTOXYLLINUM.

Recommended in five-per-cent solution in ether and alcohol as a substitute for collodion.

PICROTOXINUM.

Barely soluble in water, but more readily in alcohol and ether. It acts as an excitant to the brain as strychnine does to the cord.

Internally employed in doses of gr. $\frac{1}{120}$ to $\frac{1}{60}$ twice or three times a day, up to gr. $\frac{1}{3}$ a day, in pills, pastilles, or solution, as a substitute for strychnine. For the night sweats of phthisis it is given in initial dose of gr. $\frac{1}{120}$, gradually increased up to gr. $\frac{1}{50}$ to $\frac{1}{20}$ by the mouth or subcutaneously every second or third evening. (Must be used with great care.)

PILIGANINA.

Employed in doses of gr. $\frac{1}{6}$ to $\frac{1}{3}$ in combination with chloral hydrate, in powder, pill, or solution, for the relief of asthma.

PILOCARPUS.

Pilocarpus (jaborandi) is a powerful diaphoretic and sialagogue. When given in infusion (℥ ss.–i. in 3 ounces of water, in one dose) it increases the secretion of sweat and saliva and reduces the volume of the urine, and is apt to cause headache, vomiting, diarrhœa, increased irritability of the intestinal and uterine muscular tissue, and collapse. It must therefore be used with caution, and should be avoided when the heart's action is weak. In place of it the alkaloid, pilocarpine, is to be recommended.

Pilocarpinæ Hydrochloras.—Produces the same effect as jaborandi, but not the unpleasant incidental effects, or at least not in such a marked degree. (One-third of a grain equals in efficacy ℥ i. of the crude drug in infusion.)

Caution.—It should not be given in uncompensated heart diseases, or in general when the heart's action is weak, in marasmus, or in pregnancy (for it has been known to produce abortion).

Internally employed in doses of gr. $\frac{1}{6}$ (maximum dose, gr.

$\frac{1}{3}$, or gr. i. pro die) in pill or solution in all cases in which a curative effect may be expected from a copious secretion of sweat and saliva. It is better given—

Subcutaneously in doses of gr. viij.–xv. of a solution of gr. iij.–℥ iiss. of water, in the region of the stomach, and as far as possible from meal-time. For children the dose is gr. $\frac{1}{6}$.

1. For the removal of fluid in dropsy; in cases of œdema and dropsy in diseases of the heart and kidneys, when there is diminished secretion or suppression of urine; and in diabetes insipidus, when the injections should be continued for one or two weeks.

2. In uræmia (also in pulmonary œdema) a marked improvement is usually effected, though isolated cases have been observed in which the condition was made worse by the remedy.

3. In chronic poisoning (mercury or lead) in order to obtain elimination of the poison through the sweat and saliva.

4. To cause diaphoresis in the beginning of acute catarrhal and rheumatic diseases, and to effect a loosening of the membrane in diphtheria, but in these cases the effect is a very uncertain one; it has also been used in whooping-cough.

5. To aid in the resorption of pleuritic exudations (with questionable results).

6. During the first paroxysms of puerperal eclampsia, in convulsions of various sorts, and in singultus.

7. For the night sweats of phthisis (?).

8. To increase the force of labor pains (?).

9. In the treatment of constitutional syphilis, psoriasis, prurigo, eczema, urticaria, and other diseases of the skin (?).

10. In hydrophobia, three injections of gr. $\frac{1}{6}$ being given one after the other at short intervals, and then others at longer intervals for several days (?).

11. In chronic dry middle-ear catarrh, and to improve the hearing when it has been impaired by exudations into the tympanum and labyrinth.

12. To relieve the itching in jaundice an injection of gr. $\frac{1}{3}$ once every two or three days.

13. It is also said to favor the growth of the hair, to color light hair dark, and to cure bromidrosis of the feet (?).

Externally a solution of the strength of gr. iss.–℥ iiss. of water is used for dropping into the eye in iritis, choroiditis,

detachment of the retina; in beginning peripheral cataract as a means of temporarily improving the sight; and in glaucoma.

Pilocarpine and atropine are mutually antidotal. (Atropine gr. $\frac{1}{12}$ subcutaneously.)

PILULÆ.

The German Pharmacopœia directs that pills for which no definite excipient has been ordered should be made by mixing equal parts of powdered licorice and extract of licorice with or without the addition of a mixture of one part of glycerin and two parts of water. When possible, the pill is to be made of such a size as to weigh a grain and a half when dry.

PILULÆ ALOES ET FERRI.

See Ferri Sulphas.

PILULÆ BLAUDII.

See Ferri Sulphas.

PIPERAZIDINUM.

See Sperminum.

PISCIDIA ERYTHRINA.

Jamaica dogwood. Sedative and hypnotic. Employed only in the form of

Extractum Piscidiæ Fluidum.—*Internally* employed as a sedative in doses of thirty to fifty drops (up to ʒ iij. a day) in bronchial catarrhs, spasmodic coughs, asthma, and is especially valuable in the distressing cough of phthisis. In doses of 75 drops (the usual dose) up to 100 to 150 drops it usually produces a quiet, deep sleep.

Externally applied on cotton to aching carious teeth.

PIX LIQUIDA.

Pine-tar. Other tars employed in medicine are: Oleum cadinum, juniper-tar; Oleum fagi, beech-tar; Oleum rusci, birch-tar. (The first is frequently used when pix liquida is ordered.) The action of tar seems to be that of carbolic acid, one of its distillation products. When tar is used in large amount, toxic symptoms may arise from absorption.

Externally used with success in the treatment of many chronic skin diseases (eczema, prurigo, psoriasis) in the proportion of one part to 2 to 10 of fat, vaselin, soap, or alcohol (the strength being afterward increased), with or without opium, and caustic potassa; or the tar is applied in a layer the thickness of the back of a knife-blade, and renewed every second day until the skin has a normal appearance.

Aqua Picis.—One part of tar to three parts of pumice stone, of which two parts are added to five parts of water. Employed pure or diluted for inhalation in bronchial and pulmonary affections with profuse secretion, at first for two minutes and gradually increased to several hours a day by means of a respirator.

℞ Picis liquidæ, ... ʒ i.–ij.
Vaselini, ... ʒ iij.
M. et ft. unguentum. S. For external use.

℞ Olei cadini (or Picis liquidæ),
Saponis viridis, ... āā ℥ i.
Alcohol, ... ℥ ij.
M. S. For external use in psoriasis. (Hebra's fluid tar-soap.)

℞ Picis liquidæ,
Sapon. viridis,
Spt. odoratus (or Alcohol), . . āā ℥ ss.
M. et ft. linimentum. S. For external use. (Fluid tar-soap, for eczema, psoriasis, etc.)

℞ Picis liquidæ,
Ung. diachyli,
Ung. paraffini, ... āā ʒ v.
M. et ft. unguentum. S. Tar ointment. (Eczema.)

PLUMBI ACETAS.

Acetate of lead (sugar of lead) is soluble in water and alcohol.

Internally employed in doses of gr. ⅓–i. (maximum, gr. iss., or gr. viij. a day) in powder as an astringent remedy (often combined with opium) in diarrhœa, and as a styptic in hemorrhage of the lungs, intestine, and bladder.

It should not be given when constipation is present, nor with acid drinks. When begun in small doses combined with opium, the remedy can be gradually increased up to very large doses without producing toxic symptoms. It has a cumulative action, however. Its use should be avoided, as far as possible, when digestive disturbances are present.

Externally used where astringent remedies are indicated, in solution of gr. v.–xv. in ʒ vi., in powders, ointments, and plasters (1 part in 10 to 20); as an astringent, antiseptic, and antiphlogistic injection for the urethra and bladder (gr. iv.–viij. in ʒ iij.); and also for ophthalmic use in solution (1 to 3 in 1,000) or salve (2 to 3%). Care must be used in the external application of the remedy, especially in children, on account of the danger of acute poisoning.

Liquor Plumbi Subacetatis.—Contains 17 parts of acetate of lead and 12 of oxide of lead in 100 parts of the solution.

Externally employed: 1. In mouth washes and gargles (♏ viij.–xxiv. in ʒ iij. water) in beginning sore throat and in mercurial salivation.

2. For astringent compresses (especially in balanitis), and for lotions in contusions, extravasation of blood, erysipelas, eczema, burns, etc., usually diluted, but in from three to five times the strength in which the acetate is used.

3. In mild forms of conjunctivitis as a lotion (♏ viij.–xlv. in ʒ vi. water) or salve (♏iss.–v. in ʒ iiss. paraffin ointment).

4. For urethral injections (ʒ ss.–i. in ʒ iij. water).

5. By enema, in doses of ♏ viij.–ʒ i.

Liquor Plumbi Subacetatis Dilutus.—Lead water contains 3 parts of the preceding diluted with 97 parts of water. It is employed like the preceding, either in full strength or diluted with equal parts of water; in combination with laudanum as a collyrium; for urethral or vaginal injections; and for enemata in dose of ʒ iij.–v.

Goulard's lead water contains four parts of dilute alcohol. It is not so good for eye lotions as the non-alcoholic lead water.

Ceratum Plumbi Subacetatis.—Goulard's cerate is composed of 20 parts of solution of subacetate of lead and 80 parts of camphor cerate. It is employed as a drying and astringent ointment, and with the addition of tannin as an application to bed-sores.

℞ Plumbi acetat., ... gr. v.–xv.
Opii, ... gr. iss.–v.
Sacch. albi, ... ʒ i.
M. et div in chart. No. 10. S. One powder from three to five times a day. (Diarrhœa.)

℞ Liq. plumb. subacet., ... gr. xv.
Collodii flexilis, ... ℥ ss.
M. S. For painting on the skin in erysipelas, burns, and threatening bed-sores.

℞ Plumbi acetat., ... gr. v.–viij.
(Pulv. digitalis, ... gr. v.)
Sacch. albi, ... ʒ i.
M. et div. in chart. No. 10. S. One powder every hour or two. (Hæmoptysis.)

℞ Plumbi acetat., ... ℥ ss.
Vitell. ovi, ... No. ij.
Ol. papaveris, ... ℥ iv.
M. et ft. linimentum. S. To be stirred up and spread upon linen as an application to burns.

℞ Plumbi acetat., ... gr. xv.
Tinct. opii, ... ♏ xv.
Aq. destillatæ, ... ℥ vi.
M. S. One-half the quantity at a time for an enema.

℞ Plumbi acetat., ... gr. viij.
Acaciæ, ... ʒ i.
Aq. destillatæ, ... ℥ v.
M. S. For urethral injection in gonorrhœa.

PLUMBI CARBONAS (CERUSSA).

Externally employed as a dusting powder (not advisable for children), and in ointments and plasters.

Unguentum Plumbi Carbonatis.—Ten parts of carbonate of lead to 90 parts of benzoated lard. An astringent salve, used for frost-bites and bed-sores.

Emplastrum Plumbi Carbonatis (Cerussæ).—Composed of: 7 parts of carbonate of lead, 2 of olive oil, and 12 of lead plaster. A white, hard plaster, used with benefit in frost-bites and threatening bed-sores.

PLUMBI IODIDUM.

When applied in the form of ointment (1 part in 8 to 10 vaselin) spread on linen, it appears to be of influence in reducing the size of scrofulous and syphilitic glandular enlargements.

PLUMBI OXIDUM.

Litharge. Used only in plasters.

Emplastrum Plumbi.—Diachylon plaster, lead plaster, composed of oxide of lead, 32 parts, and olive oil 60 parts.

Emplastrum Resinæ.—Adhesive plaster. Composed of 14 parts of resin, 80 parts of lead plaster, and 6 parts of yellow wax.

Unguentum Diachylon.—Hebra's diachylon ointment is composed of equal parts of olive oil and lead plaster. It is applied, spread on flannel, in eczema, lichen, acne, sweating of the feet, etc.

PLUMBI TANNAS.

Employed in ointments (1 to 10) as an astringent, and in the form of a poultice composed of 40 parts of oak bark, 4 parts of solution of subacetate of lead, and 1 part of alcohol, for bed sores.

Unguentum Plumbi Tannatis.—Composed of 1 part of tannin, 2 of acetate of lead, and 17 of lard. Used as an application to bed-sores.

PODOPHYLLUM.

The rhizome and rootlets of Podophyllum peltatum or May apple.

Resina Podophylli.—A yellow amorphous powder or loose mass, employed as an anthelmintic, drastic, and cholagogue. It should not be prescribed with alkalies.

Internally exhibited in doses of gr. $\frac{1}{6}$–iss. two or three times a day, which may be cautiously increased, in powder or pill, in simple habitual constipation, and in about four doses of gr. ss.–i. each at two hours' interval, as a drastic cathartic. It resembles calomel in its indications and action, does not produce colic, nor is it followed by constipation. It has been

especially recommended in icterus, biliary colic, and gall stones.

Podophyllotoxinum.—Is very poisonous and must be used with great care. It is given in doses, for adults, of gr. $\frac{1}{60}$–$\frac{1}{6}$ in alcoholic solution, and may be repeated in 8 or 10 hours if necessary.

℞ Resin. podophylli, ... gr. viij.
Extr. gentianæ, ... q.s.
M. et ft. pil. No. 20. S. One or two pills at night. (Laxative.)

℞ Resin. podophylli, ... gr. v.
Extr. belladonnæ, ... gr. iij.
Pulv. glycyrrh.,
Ext. glycyrrh., ... ăă q.s.
M. et ft. pil. No. 20. S. One or two pills as required. (Laxative in gall-stone colic.)

℞ Resinæ podophylli, ... gr. iss.–v.
(Extr. belladonnæ, ... gr. iss.)
Sacch. albi, ... ʒ i.
M. et div. in chart. No. 10. S. One or two powders a day. (Laxative in gall-stone colic.)

℞ Podophyllotoxini, ... gr. ss.
Alcohol, ... ʒ i.
M. S. For children 2 to 10 drops, for adults up to 30 drops, in sweetened water or wine, at bed-time.

POTASSA.

Caustic potash (fused) is seldom employed in substance as an escharotic except in cases where a deeply acting effect is desired, as in poisoned bites, glanders, anthrax, for the gradual opening of deeply seated abscesses, for the destruction of condylomata, birthmarks, lupus nodules, warts, chancres, etc. The surrounding parts should be protected by adhesive plaster.

In the treatment of in-growing toe-nail, the latter is moistened with a warmed 40% solution of caustic potassa, whereby the upper layers are made as soft as butter and may be easily scraped off by a piece of broken glass (a steel instrument

should not be used.) This process is repeated until the nail is as thin as a sheet of paper, when it is raised by means of a pair of forceps from beneath the overlapping soft parts and cut off with scissors. A 50% solution is also used in the treatment of chronic skin diseases, especially eczema, in proliferations, etc., but with great care. For a general bath ʒ i.–iij. of the solution may be added to the water, and ʒ ss.–i. per quart for local baths.

Liquor Potassæ.—Contains about 5% caustic potash, and is employed like the preceding.

Spiritus Saponatus.—Composed of olive oil 6 parts, liquor potassæ (strong, containing 15% caustic potash) 7 parts, water 17 parts, and alcohol 30 parts. It is used as a liniment in seborrhœa, and also in contusions, rheumatic pains, etc.

Potassa cum Calce.—Equal parts of caustic lime and caustic potash. When made into a paste with a little alcohol, it constitutes Vienna paste, a powerful escharotic. It is allowed to remain on the part for from 5 to 30 minutes, the surrounding integument being protected by adhesive plaster.

POTASSIUM SALTS.

The alkaline base acts somewhat like digitalis, increasing the blood-pressure in small doses, and in large and long-continued doses depressing the heart's action; the temperature is not affected by medicinal doses. In general the sodium salts, which are better tolerated by the stomach, are to be preferred.

POTASSII ACETAS.

Very hygroscopic. Internally employed in doses of gr. viij.–xlv. in solution several times a day, as a diuretic.

Liquor Potassii Acetatis.—Containing 33% of acetate of potassium. Diuretic and diaphoretic, resembling in other respects the alkalies in general.

Internally employed in tablespoonful doses of a solution of ʒ ss.–i. in ℥ vi. of water, every two or three hours in chronic and acute nephritis (not in the first stage), dropsy, and rheumatism (see Potassii Carbonas, into which this salt is changed in the blood) when at the same time an antacid action in the stomach is not aimed at.

℞ Potassii acetatis, ... ʒ v.
Aq. destillatæ, ... ℥ v.
Succi juniperi, ... ℥ i.
Sp. ætheris nitrosi, ... ʒ i.
M. S. One tablespoonful every two hours. (Dropsy.)

℞ Infus. digitalis, ... ℥ v.
Liq. pot. acetatis,
Oxymel. scillæ (or Syr. simplicis), . āā ʒ v.
M. S. A dessertspoonful every two hours. (Dropsy.)

LIQUOR POTASSII ARSENITIS.

See Acidum Arseniosum.

POTASSII BICARBONAS.

Occurring in the form of crystals, slowly soluble in four parts of water, but insoluble in alcohol, effervescing in the presence of acids. Employed in powders, effervescing powders, and mixtures (with equal parts of tartaric acid) in dyspepsia, vomiting, and cardialgia. It is, however, seldom used, the corresponding sodium salt being preferable.

POTASSII BICHROMAS.

A caustic. Externally employed in powder or solution (ʒ i.–v. in ℥ iij.) as a caustic for condylomata, scrofulous and cancerous growths, and especially recommended as an application to nasal polypi and other new growths.

In the form of Müller's fluid (bichromate of potassium 40 parts, sulphate of sodium 100 parts, water 1,000 parts) it is used to harden anatomical preparations.

POTASSII BITARTRAS.

Cream of tartar (soluble in 180 parts of water) is a mild, cooling, saline laxative and diuretic.

Internally employed in doses of gr. viij.–xxx. in powder, electuary, or as an ingredient of cathartic and diuretic mixtures. Also as a cooling addition to drinking-water.

℞ Potass. bitart., ... ʒ iiss.
Pulv. digitalis, ... ʒ ss.
M. et div. in chart. No. 20. S. One powder three times a day. (Palpitation of the heart.)

℞ Potass. bitart., ... ℥ ss.
Pulv. digitalis, ... gr. xxij.
Succi juniperi insp., ... ℥ iss.

M. S. One teaspoonful three times a day. (Diuretic electuary in diseases of the heart.)

POTASSII BROMIDUM.

The specific action of bromine on the brain and spinal cord is shown in a decrease of mental activity, reflex excitability, and sensation, and in a tendency to sleep. As bromide of potassium also lowers the temperature, it is better than all the other remedies in the sleeplessness and restlessness accompanying feverish conditions. The four bromine salts, potassium, sodium, ammonium, and lithium—contain different proportions of bromine (68, 80, 88, and 92% respectively), but possess equal antispasmodic, sedative, and hypnotic action. Yet a mixture of the potassium, sodium, and ammonium salts in the proportion of 1 : 1 : ½ has a much better effect than either of the salts alone, when given in the same or even larger doses. The use of the combined salts does not produce acne, and it will even cause the disappearance of an eruption which has followed the use of one of the salts alone.

Internally employed in powder or in simple aqueous solution, as it is apt not to form a clear mixture with syrup, and also in pills, in doses of gr. viij.–xxx. several times a day up to ℥ ss., as may be indicated.

1. Bromide of potassium, alone or in the combination above mentioned, is, when properly given, a sovereign remedy in epilepsy. In the beginning 15 grains in powder or solution (of the strength that a tablespoonful will hold 15 grains) three times a day; in the second week the same amount 4 times a day, and so on, increasing the dose by 15 grains a day each week until 150 grains a day are being taken. If the attacks still occur, the dose may be increased gradually in the same way up to ℥ ss. a day, unless it should otherwise cause serious disturbance. If now an improvement is obtained, the dose may be gradually decreased in the same proportion as it was raised, to be again increased if the attacks recur. The long-continued exhibition of large doses gives rise to toxic symptoms (bromism), such as skin eruptions (acne, urticaria, rarely ulcerating nodules),

catarrh of the mucous membranes (cough, etc.), motor disturbances, and disturbances of nutrition (loss of appetite, diarrhœa, emaciation), and slight psychic disorder. In such a case the dose of the remedy should be diminished gradually, not suddenly withdrawn entirely, and the salt should be given in the form of Erlenmeyer's bromine-water (see below), or in sweetened water with a little red wine, shortly before meals.

2. In chorea minor in children, the administration of the remedy should be begun in doses of gr. viij. (best in the form of Erlenmeyer's bromine-water) three times a day shortly before or after eating, and gradually increased every three days until a daily amount of 75 grains, taken in three doses, is reached; at the same time antipyrine is to be given, at first in doses of gr. viij. three times a day, and gradually increased (the effects being carefully watched) up to gr. xv. three times a day.

3. In so-called nervous states and neurasthenia (mental excitability, insomnia, etc.), bromide of potassium may be given in doses of gr. xv.–xlv. each.

4. In spasmodic affections of various kinds, puerperal eclampsia, and infantile convulsions, in the vomiting of pregnancy, hysterical cramps (uterine), it is required in doses of not less than 45 grains a day.

5. In nocturnal spasmodic cough (laryngismus stridulus and night-crying in children), one to two teaspoonfuls of a solution of ʒ ij.: ℥ iv. may be given; the same dose may be used in whooping-cough, in which affection a spray of a ½–2% solution may also be inhaled.

6. In tetanus in large doses; to diminish sexual irritability (troublesome erections, too frequent pollutions, chordee), from 15 to 30 grains may be given an hour or two before bed-time.

Externally in enemata of gr. xlv.–lxxv. in ℥ iij.–v. of a mucilaginous solution to prevent its rejection. Its effect when given by inhalation or local application is doubtful.

Erlenmeyer's bromine-water is a natural carbonated water which contains in a bottle, of about 24 ounces, ʒ iiss. of bromine salts, viz., bromide of potassium and of sodium, each ʒ i., and of ammonium ʒ ss., and definite amounts of carbonate of magnesium, chloride of sodium, bicarbonate of sodium, carbonate of lithium, and sulphate of sodium. It is pleasant to take and is very well borne.

℞ Potass. bromid.,
Sodii bromid., ... āā ʒ ij.
Ammon. bromid., ... ʒ i.
Aq. destillatæ, ... ℥ vi.

M. S. A tablespoonful three or four times a day in one-half glass of seltzer water. (Nervous insomnia, chorea, and epilepsy.)

℞ Sodii bromid.,
Ammon. bromid., ... āā ʒ iiss.
Aq. destillatæ, ... ʒ xij.

M. S. A teaspoonful every hour. (Is said to act very well in delirium tremens.)

℞ Sodii bromid., ... ʒ iiss.–iv.
Lupulini,
Pulv. camphoræ, . . . āā gr. viij.–xxij.

M. et div. in chart. No. 10. S. One or two powders, in wafers, at night. (Frequent pollutions.)

℞ Decoct. althææ, ... ℥ iv.
Sodii bromidi, ... ʒ i.
Syr. simplicis, ... ℥ i.

M. S. Two teaspoonfuls every hour. For croup. At the same time inhalations of the following may be given:

℞ Potass. bromidi,
Bromi puri, ... āā ʒ i.
Aq. destillatæ, ... ℥ vi.

M. S. Two teaspoonfuls poured on a sponge in a paste-board cone or a tin funnel, and inhaled for five or ten minutes every half-hour. At the same time the throat may be touched with the solution on a camel's-hair brush or swab. (In diphtheritic croup, recommended on account of the strongly antiseptic properties of the bromine.)

POTASSII CARBONAS.

Internally employed in doses of gr. iij.–xv. several times a day in well-diluted solutions, saturations, or effervescent mixtures as a diuretic—

1. In acute or chronic rheumatism and gout, in uric-acid concretions, and chronic cystitis; also in icterus, and—

2. In acute and chronic articular rheumatism, taken on an

empty stomach, for a considerable period of time, where there is a slight degree of abnormal acidity without any very marked digestive disturbances. When too long continued, it disorders the digestion in a marked degree; and for that reason, when alkalies are indicated in cases of gastric disturbance, the sodium salt is to be preferred.

Liquor Potassii Carbonatis.—Three parts contain one of potassium carbonate.

Internally employed, like the salt, in doses of 20 to 30 drops in mixture or saturation.

Externally applied in washes to pityriasis, etc.

Crude carbonate of potash, commercial potash, may be employed in baths or pediluvia in the proportion of ℥ iss.–vi. to the bath.

℞ Potass. carbonatis, ... gr. lxxv.
Aceti scillæ, ... q. s.
ad saturationem.
Aq. destillatæ, ... ℥ v.
Tinct. digitalis, ... ♏ lxxv.
Syr. simplicis, ... ʒ v.
M. S. A tablespoonful every two hours. (A diuretic saturation.)

℞ Potass. carbon., ... ʒ i.
Aq. melissæ, ... ℥ iv.
Spt. æther. nitrosi, ... ʒ ss.
Syr. aurant. cort., ... ʒ v.
M. S. A tablespoonful every hour or two. (Antacid and antispasmodic, given also in asthma.)

POTASSII CHLORAS.

An antiseptic. It is very highly valued as a specific remedy in diseases of the mouth and throat, and is at the present day applied for the most part locally, its internal use being less frequent by reason of its uncertain and often poisonous action. Large doses, or small ones long continued, may cause vomiting, diarrhœa, tenesmus, icterus, bloody urine, anuria, extreme depression, weak pulse, dyspnœa, cyanosis, collapse, etc.; especially is this the case in children. The treatment of poisoning by chlorate of potassium consists in the administration of stimulants, diuretics, pilocarpine, and solution of

common salt. The drug should never be given on an empty stomach, for fear of too rapid absorption. Chlorate of potassium triturated alone or especially with inflammable substances, such as charcoal, sulphur, etc., readily explodes. The administration of the chlorate and iodide of potassium in combination should also be avoided.

Internally employed (rarely) in doses of gr. iss.–v. several times a day (maximum dose for a child gr. xv., and for an adult ʒ i.–iss. a day), best in solution alone.

1. In diseases of the mouth and throat of various kinds, such as scurvy and aphthous stomatitis (greatly diluted), but especially for the prevention or cure of mercurial stomatitis.

2. In vesical catarrh; a tablespoonful of a solution of ʒ iiss. in ℥ x. every two or three hours.

Externally in one to five per cent aqueous solution (of which a teaspoonful in a glass of water) in the above-named affections, for application on a brush, gargle, and inhalation. Also used for toothache, a small piece placed in the painful cavity; or as a mouth wash (ʒ i.–iiss. in ℥ vi.).

℞ Potass. chlorat., ... gr. xxx.–lxxv.
Aq. destill., ... ℥ iij.–v.
Syr. aurant. cort., ... ℥ i.
M. S. A teaspoonful every hour. (Thrush, ulcers of the mouth.)

℞ Potass. chloratis, ... ʒ iiss.
Aq. destillatæ, ... ℥ v.
Tr. guaiaci, ... ʒ iiss.
M. S. One to two tablespoonfuls in a glass of water, as a gargle. (Chronic pharyngitis.)

℞ Potass. chloratis, ... ʒ i.
Glycerini, ... ʒ ix.
M. S. For pencilling the throat, pure; or a teaspoonful in a glass of water as a gargle.

℞ Potass. chloratis, ... ʒ i.
Liq. calcis, ... ʒ iij.
Aq. destillatæ, ... ʒ xij.
M. S. For pencilling the throat, undiluted; six tablespoonfuls in a glass of water as a gargle.

POTASSII ET SODII BOROTARTRAS.

A deliquescent salt.

Internally employed as a diuretic, in doses of a teaspoonful of a mixture of ʒ ss.–i. in ʒ vi. of infusion of squill, as a laxative in doses of ʒ ss.–i. taken in divided portions at frequent intervals.

POTASSII ET SODII TARTRAS.

Rochelle salt. A readily soluble, mild laxative, given in doses of ʒ ij.–iv. in water alone, or as an adjuvant to other laxatives.

POTASSII IODIDUM.

Soluble in water, alcohol, and glycerin.

Cautions.—Beware of too long administration in marasmic conditions and especially in pulmonary phthisis, of too large doses when the digestion is poor, although small doses at first increase the appetite. Nevertheless large doses (ʒ ss. a day) of pure iodide of potassium, continued for a long time, have been given without prejudice to digestion or nutrition. Avoid giving chlorine or bromine salts, acids, or metal salts in combination during the period of digestion.

Diet.—During the use of iodide of potassium the patient should eat nourishing food, preferably as far as possible animal food, and may be allowed a little beer and wine, but should avoid the ingestion of strong acids. The best time for giving the drug for syphilis is after meals, and it should be taken with large quantities of water; but when it is desired to affect remote organs the best time to give it is on an empty stomach. The patient should be careful to avoid taking cold, on account of the predisposition to catarrhs of the nose, throat, and bronchi which the drug causes.

Internally employed in doses of gr. iss.–viij. or more several times a day up to ʒ ss. pro die, in solution or pill—

1. In secondary and especially in tertiary syphilis, for the joint affections, gummous tumors, and ulcerative troubles of the skin and mucous membranes. In sphilitic pustulous eczema, ecthyma, and rupia, and in syphilitic fever. In the case of weak, cachectic patients, iodide of potassium should be first

tried and a resort had to mercury only when this fails. (Some authorities give very large doses, gr. lxxv. up to ʒ ss. a day, but no particular advantage is gained by this. A tablespoonful of a solution of ʒ iiss. in ʒ vi.–x. three times a day after eating will usually be tolerated for a long time.)

2. In other chronic constitutional diseases, scrofula (with hypertrophies), rheumatism, etc. The action of the drug in scrofulous affections of the joints, skin, and mucous membranes is less certain, but in acne it is a favorite remedy (see the formulæ).

3. In hypertrophies of all sorts, idiopathic as well as the result of chronic inflammatory processes, such as goitre, hypertrophied testicles, enlarged lymph nodes, etc.

4. In neuralgias (especially trigeminal and sciatica) of syphilitic or rheumatic origin. Also in chronic rheumatism, deforming joint inflammations, and in obstinate priapism, in doses of gr. iij. four times a day.

5. In chronic metallic poisoning (lead and mercury).

6. In nervous asthma, combined with chloral, in large daily doses of gr. xxiv.–xlv. or if necessary even more, or for a longer period in more moderate doses (gr. viij. three times a day) and by inhalation of a spray (gr. viij.–xv. in ʒ vi.). It is the principal ingredient of Aubrée's nostrum. In Sée's method the remedy is given in rapidly increasing doses from gr. xxiv. to gr. lxxxv. a day.

Externally employed in mouth washes and gargles (gr. xv.–xlv. in ʒ iij.) and spray inhalations (gr. xv.–xl. in ʒ xvi.) in syphilitic affections of the mouth, pharynx, larynx, and nasal cavities. Subcutaneously in ten to thirty per cent solution for syphilitic periostitis (painful). It is also used as an injection after emptying the sac in hydrocele (see formula).

Unguentum Potassii Iodidi.—Composed of 12 parts iodide of potassium, 6 parts boiling water, 1 part hyposulphite of sodium, and 81 parts benzoinated lard. (Mixtures of iodide of potassium and blue ointment are often prescribed, but these are very irritating, by reason of the formation of iodide of mercury, and should only be used when a derivative effect is desired. The iodide of potassium ointment can be made stronger by the addition of pure iodine in the proportion of gr. iij.–ʒ iiss.). More active than this officinal ointment are alcoholic solutions of the iodide, with iodine or tincture of

iodine added if desired. Recently mollinum (*q.v.*) has been recommended as a good base for iodide of potassium ointment.

℞ Potass. iod., ... 3 ss.–iiss.
Aq. destill., ... 3 vi.
M. S. A tablespoonful three or four times a day in milk. (Asthma, paralysis, rheumatism, syphilis, etc.)

℞ Potass. iodidi, ... 3 ¾–i.
Aq. menth. pip., ... ℥ vi.
M. S. Two teaspoonfuls three or four times a day. For acne. The pustules ought to disappear by the end of one or two weeks; then for a week the solution is taken in the above dose only twice a day, and once a day the week following.

℞ Potass. iodidi, ... gr. xxx.–lxxv.
Potass. bromidi, ... gr. lxxv.
Aq. destillatæ, ... 3 iiss.
M. S. Twenty drops three times a day in water. (Syphilitic neuroses.)

℞ Potass. iodidi, ... 3 i.–ij.
Aq. destillatæ, ... ℥ vi.
Tinct. colchici, ... ℥ ss.
M. S. A tablespoonful three times a day. (Chronic rheumatism.)

℞ Iodi, ... gr. xv.
Potass. iodidi, ... 3 ss.
Aq. destillatæ, ... ℥ iij.
M. S. For injection in hydrocele, etc. (Diluted with from three to five parts of water.)

℞ Potass. iodidi, ... gr. xv.
Tr. opii, ... ♏ xv.
Alum. exsiccati, ... gr. xxxvij.
Ung. aq. rosæ, ... 3 v.
M. et ft. unguentum. S. For chilblains.

℞ Potass. iodidi, ... gr. xv.
Empl. conii,
Empl. resinæ, ... āā gr. lxxv.
M. et ft. emplastrum. S. For application to chronically inflamed joints.

POTASSII NITRAS.

Saltpetre. Refrigerating and diuretic.

Internally employed (not well borne by the stomach)—

1. In doses of gr. v.–viij. in solution (gr. lxxv.–cl. in ℥ iij.) as a diuretic in simple hydræmic dropsy, after pleurisy and pericarditis, but contra-indicated in inflammatory conditions of the renal parenchyma; also, but only in very weak solution, as a cooling drink. Although it is useless as an antiphlogistic, it is nevertheless employed in—

2. Acute articular rheumatism in doses of a tablespoonful every hour of a solution of ℥ ss. in ℥ v. of water with syrup.

Externally.—A mixture of common salt and (commercial) saltpetre, laid between moist compresses, is employed as a refrigerant when ice cannot be obtained. This acts much as the so-called Schmucker's fomentations, composed of 3 parts of saltpetre, 1 part of chloride of ammonium or chloride of sodium, 6 parts of vinegar, and 12 to 24 of water.

Charta Potassii Nitratis.—Nitre paper. Blotting paper moistened with a twenty-per-cent solution of nitrate of potassium and then dried. A piece about four inches square is burned on a plate and the fumes inhaled in emphysema and asthma. The action of nitre paper is enhanced if it be dipped in a solution of stramonium and dried.

Pulvis Temperans.—Composed of 1 part nitrate of potassium, 3 parts of tartaric acid, and 6 of sugar. Used as a sedative in doses of one-half to one teaspoonful dissolved in water several times a day.

℞ Potass. nitrat., ... ʒ i.
Aq. destillat., ... ℥ iv.
Syr. simpl., ... ℥ i.

M. S. A tablespoonful in water every two hours as a cooling beverage.

℞ Potass. nitratis, ... ʒ iss.
Acidi nitrici, ... ♏ xlv.
Decoct. hordei, ... ℥ x.
Spt. æther. nitros., ... ʒ iss.
Sacch. albi, ... ʒ vi.

M. S. A tablespoonful every two hours. (A powerful diuretic in dropsy.)

POTASSII PERMANGANAS.

Occurring in dark violet, almost black prisms, soluble in 2½ parts of water.

Externally employed in solution in distilled water (avoid mixtures with any organic substance), in the proportion of gr. iv.–xv. to ʒ iij., as a disinfectant and deodorant for foul cancerous and other forms of ulcers; as a mouth wash (a teaspoonful of the solution in a glass of [peppermint] water); as an injection for gonorrhœa, and for washing out the bladder (gr. iss. in ʒ vi. water); and as a wash in sweating of the feet, for the hands after dissections and post-mortem examinations, etc. Every physician should keep on hand a five-per-cent solution, for disinfecting the hands (a tablespoonful of the solution in half a pint of water) and as a mouth wash and gargle after having attended patients with diphtheria, scarlet fever, or other contagious diseases (a teaspoonful of the solution in half a pint of water). A dilute oxalic-acid solution will at once remove the stain from the hands.

Subcutaneous injections of ♏ viij. of a one-per-cent solution have been employed as an antidote in snake bites.

POTASSII SILICAS.

Soluble glass. Used for splints. See Sodii Silicas, which is more commonly used for this purpose.

POTASSII SOZOIODOLAS.

See Sozoiodolum.

POTASSII SULPHAS.

Occurs in Carlsbad salts. Resembles sulphate of sodium in its action and may be employed in the same dose; it has a less disagreeable taste, but is more apt to disorder the digestion.

POTASSA SULPHURATA.

Acts as a poison through the formation of sulphide of hydrogen, the effects of which are important therapeutically in cases of chronic lead or mercurial poisoning.

Externally used in baths, here better in the form of the "potassa sulphurata ad balneum," ʒ iss.–vi., with the addition

of ʒ iss.–vi. of commercial sulphuric acid in order to favor the formation of sulphide of hydrogen, which is absorbed through the skin. In order to prevent inhalation of the gas, the bath-tub should be covered with a cloth. The patient should remove any rings he may be wearing; and the possibility of sulphuretted-hydrogen poisoning calls for special caution.

These baths are given in cases of chronic lead and mercury poisoning, rheumatism, and certain skin diseases—psoriasis, eczema, impetigo, and pityriasis versicolor; for the last-named a simple wash employed a few times will usually suffice.

For washes a solution of ʒ i.–iv. in ℥ iij. of water will answer, and an ointment is made in the proportion of 1 part of sulphurated potassa to 5 or 10 of ointment.

POTASSII TARTRAS.

Internally employed in doses of gr. xv.–xxx. several times a day, as a diuretic, in simple solution or as an ingredient of diuretic mixtures. It may be given as a laxative in doses of ʒ i.–iiss., but is not often used on account of its disagreeable taste. It is an ingredient of the species laxantes.

POTIO RIVERI.

See Sodii Carbonas.

PROPYLAMINUM.

A fluid resembling water, with the odor of herring-brine, readily soluble in water.

Internally recommended in doses of 2 to 6 drops several times a day, in capsules or aqueous solution, in chronic muscular rheumatism and chorea.

℞ Propylamini, ... ♏ xxiv.
Aq. destillatæ, ... ℥ v.
Syr. rubi idæi, ... ʒ v.
M. S. A tablespoonful every two hours. It is said to cause quickly profuse sweating in rheumatism and to bring about an improvement with reduction of the swelling after two days.

℞ Propylamini, ... ʒ i.
Aq. menth. pip., ... ʒ x.
Syr. simplicis, ... ʒ iv.
M. S. One teaspoonful three times a day. (Chorea.)

PULVIS AEROPHORUS.

An effervescing powder, composed of bicarbonate of sodium, 10 parts; tartaric acid, 9 parts; white sugar, 19 parts; thoroughly dried and mixed.

PULVIS GLYCYRRHIZÆ COMPOSITUS.

See Glycyrrhiza.

PYOKTANINUM.

An antiseptic substance derived from anilin colors, occurring in two colors, blue and yellow, either of which is employed in solution (1:100 for surgical, and 1:2,000 for ophthalmological purposes), in powder (2 parts to 100 of talc), and in pencils. It acts as a microbicide in fresh as well as suppurating and ichorous wounds, produces no unpleasant incidental effects, and promotes rapid healing. The wounds or ulcers, especially gummy ulcers, soft chancres, and buboes, are simply painted with a one-per-cent solution and then covered with pyoktanin gauze or cotton (1:1,000). Injections of a 1:500 or 1,000 solution are recommended in gonorrhœa. For conjunctivitis or keratitis, compresses are applied of a solution of the same strength. Pyoktanin ointments are made of the strength of gr. v.–viij. in ʒ v. of fat. The stains on the skin or linen can be removed by mopping with dilute hydrochloric acid, or by tincture of soap. One disadvantage in the use of pyoktanin is that the blue color masks the wound so that one cannot see what its actual condition is.

PYRIDINA.

A colorless, volatile fluid, of a penetrating and very troublesome odor, which is formed in the dry distillation of bone, coal, etc., is also a decomposition product of various alkaloids (cinchonine, quinine, morphine, etc.), and finally is found in tobacco smoke.

Internally recommended in doses of 6 to 10 drops two or three times a day in diseases of the heart.

Externally employed in asthma of every kind, especially the nervous form. The patient puts about ʒ i. in a saucer, in a small room, and inhales the vapor mixed with the air of the room for twenty to thirty minutes two or three times a day;

or he may inhale 10 to 15 drops in a handkerchief applied to the mouth and nose. The remedy is especially recommended in cases in which the production of iodism renders the use of iodine impossible.

It has also been recommended as an application in ten-per-cent aqueous solution to the pharynx in diphtheria.

It must be used internally with caution, as it often causes vomiting, vertigo, and syncope, and it should therefore be avoided in the case of greatly debilitated individuals with weak heart's action and marked congestive symptoms.

PYROGALLOLUM.

See Acidum Pyrogallicum.

QUEBRACHO.

Highly esteemed in the dyspnœa of spasmodic and bronchial asthma and emphysema, but less so in that of heart disease, phthisis, and nephritis with œdema. It is also recommended in the treatment of diarrhœa. It is used in the form of the following preparations.

Extractum Quebracho.—Employed in doses of gr. iss. in alcoholic solution or pills in the diarrhœa of children.

Extractum Quebracho Fluidum.—Dose, 20 to 60 minims.

Tinctura Quebracho.—*Internally* given in doses of ʒ ss.–i. two or three times a day, tentatively at first.

℞ Extracti quebracho fl., ... ℥ i.
Aq. destillatæ, ... ℥ ij.
M. S. One or two teaspoonfuls three times a day. (Asthma, dyspnœa.)

℞ Tinct. quebracho, ... ℥ ss.
Sodii bromidi, ... ʒ iiss.
Aq. destillatæ, ... ℥ v.
M. S. One or two tablespoonfuls mixed in one-half pint of water as a gargle. (Chronic pharyngitis.)

QUILLAIA.

An expectorant employed as a substitute for senega, and said to be better borne than it.

Internally given in powder in doses of gr. iss. with gr. viij. of Dover's powder three or four times a day, or in the dose of a tablespoonful of a decoction (gr. lxxx.–ʒ iij. for adults; gr.

xl.–℥ iij., with or without syrup, for children), in respiratory catarrhs with scanty, viscid expectoration, but without very severe cough, and in bronchitis.

QUININA.

See Cinchona.

RESORCINUM.

Antiseptic. Synthetically prepared with benzol and its derivatives. Soluble in water.

Internally employed in doses of gr. v. to xv. or even xxx. in wafers and aqueous solution as an antifermentative remedy in acute and chronic gastric and intestinal catarrh, septic diarrhœa, and fermentative changes in the stomach; also in obstinate vomiting from any cause, in doses of gr. xv.–xlv. But the internal use of the drug is not to be recommended because of its frequent toxic effects, such as vertigo, somnolence, diaphoresis, chills, etc.

Externally applied in one to ten per cent solutions or in ten to forty per cent ointments or pastes, in various cutaneous affections such as acne, chronic eczema, and eczema marginatum, seborrhœa, psoriasis, pityriasis, etc.; in erysipelas in twenty-five-per-cent ointment with vaselin; and in three-per-cent solution for washing out the urethra, bladder, vagina, stomach, and rectum. It stains the skin brown, but the discoloration can be removed by citric acid.

It is also employed as a disinfectant for surgical instruments, which it neither dulls nor rusts.

℞ Resorcini, ... gr. viij.–xlv.
Aq. destillatæ
(or Emuls. amygdal. dulcis), . . ℥ iij.
Tinct. cinnamomi, ... ʒ ss.
Syr. aurant. cort., ... ℥ i.
M. S. A tablespoonful every two hours.

℞ Resorcini, ... ʒ ss.–i.
(or Acidi salicyl., ... ʒ ss.)
Zinci oxidi,
Amyli, ... āā ʒ i.
Vaselin. flav., ... ʒ iij.
(or Vaselin. et lanolin., . . . āā ʒ iss.)
M. et ft. unguentum. S. Rub on the affected parts after a warm bath, and allow it to remain for two hours. (Eczema.)

RHATANY.

See Krameria.

RHEUM.

Rhubarb in small doses is constipating by reason of the tannic acid which it contains, and stomachic through an unidentified bitter principle; in larger doses it is laxative in consequence of the cathartic acid (found also in senna) which is one of its chief constituents. Its coloring matter, chrysophanic acid, passes out in the sweat and urine, staining the latter a greenish to a brownish yellow.

Internally employed usually in powder: 1. In weak digestion, and dyspepsia with a tendency to diarrhœa, especially in children, in doses of gr. ½–iij.

2. As a laxative in doses of gr. viij.–xxiv. repeated, of especial value in jaundice and when it is desirable to disturb the digestion as little as possible.

Extractum Rhei.—Given in doses of gr. iss.–v. as a tonic, gr. viij.–xxiv. as a laxative several times a day, in pills or solution.

Extractum Rhei Compositum.—Contains extract of rhubarb, 6 parts; extract of aloes, 2; resin of jalap, 1; and soap, 4 parts. It is employed like the preceding, in doses of gr. v.–viij., as a good purgative.

Extractum Rhei Fluidum.—Given in doses of one-half to three teaspoonfuls as a purgative, and in smaller doses as a tonic.

Tinctura Rhei.—Dose, a teaspoonful to a tablespoonful.

Tinctura Rhei Aromatica.—Contains rhubarb, cinnamon, cloves, and nutmeg. Dose, ʒ i.–ij., as a stomachic and tonic.

Syrupus Rhei.—Given to children pure, and also employed as an ingredient in various extemporaneous mixtures.

Mistura Rhei et Sodæ.—Bicarbonate of sodium, fluid extract of rhubarb, spirit of peppermint, each 30 parts, in water 1,000 parts. Dose, a teaspoonful to a tablespoonful two or three times a day, as a stomachic tonic in dyspepsia.

℞ Infusi rhei (rhei, ʒ i.), ... ℥ v.
Sodii bicarb., ... ʒ i.
Syr. cinnamomi, ... ℥ i.

M. S. A tablespoonful every two hours. (Protracted catarrhal gastro-duodenitis with jaundice; constipation.)

℞ Pulv. rhei . . . . . ʒ iiss.
Ext. rhei comp., ... gr. lxxv.
Glycerini, ... q.s.
M. et ft. pil. No. 80. S. Two to five pills at night, as required. (Gently laxative.)

℞ Tinct. rhei, ... ℥ ss.
Magnesii carb., ... ʒ i.
Aq. fœniculi, ... ℥ i.
M. S. A teaspoonful every two or three hours. Shake the bottle. (Stomachic.)

℞ Mannæ confect., ... ℥ ss.
Aq. fœniculi, ... ℥ ij.
Tinct. rhei, ... ℥ ss.
M. S. A dessertspoonful as required. (Laxative for young children.)

℞ Pulv. rhei, ... ʒ iiss.
Sodii sulphat., ... ʒ ij.
Sodii bicarb., ... gr. xlv.
Ol. fœniculi, ... gtt. xxv.
M. et ft. pulvis. S. A teaspoonful at night, in wafers. (Slightly laxative.)

℞ Pulv. rhei,
Sodii bicarb., ... āā ʒ ss.
Sacch. albi, ... ʒ i.
M. et div. in chart. No. 10. S. One powder three or four times a day. (Catarrhal gastritis, jaundice, etc.)

℞ Extr. rhei,
Extr. aloes,
Resin. jalap., ... āā ʒ ss.
Pulv. glycyrrh.,
Extr. glycyrrh., ... āā q.s.
M. et ft. pil. No. 40. S. Two pills morning and evening, as a laxative.

℞ Tinct. rhei aromat.,
Elix. aurant. comp., ... āā ℥ i.
M. S. A teaspoonful two or three times a day. (Stomachic.)

℞ Sodii bicarb., ... gr. xlv.
Aceti vini, q.s. ad perfect. saturationem, ℥ iij.
Tr. rhei,
Syr. rhei, ... āā ℥ i.
M. S. A tablespoonful several times a day. (Stomachic.)

RHUS AROMATICA.

Given in the form of the fluid extract in doses of 5 drops morning and evening for children up to two years, 10 drops from that age up to six years, and 15 to 30 drops for older children in nocturnal enuresis.

RICINUS.

See Oleum Ricini.

ROSMARINUS.

The leaves of Rosmarinus officinalis, rosemary.

Oleum Rosmarini.—*Externally* used as an ingredient of stimulating ointments and liniments, and applied pure to destroy pediculi pubis.

Unguentum Rosmarini Compositum.—Composed of oil of rosemary and oil of juniper, each 1 part; oil of nutmeg and yellow wax, each 2 parts; and lard, 16 parts. A stimulating and irritant ointment.

ROTTERINUM.

A disinfectant and antiseptic mixture, officially recommended in Bavaria as a substitute for carbolic acid and corrosive sublimate. It occurs in the form of pastilles, of which four are dissolved in a quart of water to make a solution of proper strength. Four pastilles contain:

℞ Acidi citrici,
Thymoli, ... āā gr. iss.
Acidi salicyl., ... gr. x.
Acidi borici, ... gr. xlv.
Zinci chloridi,
Zinci sulpho-carbol., ... āā gr. lxxv.
M. et ft. pastilli No. 4.

The powerful anti-suppurative properties of rotterin render it not only extremely serviceable in surgical and obstetrical

practice, but also suitable for a gargle in tonsillitis and scarlatinal sore throat, a mouth wash in stomatitis and syphilitic ulcers of the tongue, for washing out the bladder in cystitis and the pleural cavity in empyema, for an injection in gonorrhœa, for a collyrium, and for syringing the ears. It may also be used in ointment (gr. xv.– ʒ i. in ʒ i. lanolin) in inveterate sycosis, etc.

SACCHARA.

Saccharine matters are changed in the intestinal canal and in the blood, after passing through various intermediate stages, into carbonic acid and water. They are intimately associated with the formation of fat and the production of heat, and are laxative. The long-continued use of large quantities disorders the digestion, causing acidity, heartburn, diarrhœa, etc. Sugar acts injuriously upon the teeth, not directly, but through the acid fermentation of portions remaining in the mouth. When gastric catarrh exists, the lactic and acetic acid fermentation begins in the stomach, but otherwise in the intestinal canal.

Sugar is expectorant in laryngeal and bronchial catarrh. Its use should be avoided in diarrhœa or a tendency to it, catarrh of the stomach, obesity, and diabetes, and should be restricted in rachitis and osteomalacia.

SACCHARINUM.

Saccharin, benzoic sulphinide, is a derivative of benzoic acid and is not a carbohydrate. It is a white, intensely sweet powder, slightly soluble in cold, but readily so in warm, water, made synthetically from coal tar. It is three hundred times as sweet as sugar, and a tablet weighing one grain is sufficient to sweeten a cup of coffee.

Saccharin is not a remedy, but only a flavoring principle, which finds its application in diabetes as a sweetening agent for food, which can be taken without prejudice to the disease. When taken in quantities as high as ʒ i. it passes unchanged through the organism and is excreted in the urine, but not in the saliva or milk. The claims made for it as an antiseptic and microbicide have not been substantiated. It is recommended as a gargle and mouth wash to correct bad breath, in the following formula:

℞ Saccharini,
Sodii bicarb., ... āā gr. xv.
Acid. salicyl., ... ʒ i.
Alcohol., ... ʒ vi.

M. S. A few drops in a glass of water, as a mouth wash and gargle.

SALEP.

Internally employed in doses of gr. viij.–xxiv., up to ʒ iiss. a day in powder, or more commonly in decoction of gr. viij.–xv. to ʒ iij., as a nutrient material in diarrhœas of children.

Mucilago Salep.—Given in doses of a teaspoonful to a tablespoonful alone or in extemporaneous mixtures and enemata. It is readily prepared in the following way: A teaspoonful of the powder, moistened with a couple of drops of alcohol to prevent lumping, is stirred up with a little cold water and on it is poured about two glassfuls of hot water, meat-broth, or milk, allowed to come to a boil, and then flavored with sugar, cinnamon, or red wine.

SALICINUM.

Antipyretic. It is given in doses of gr. viij.–xxiv. (ʒ i.–iiss. a day) in powder, pill, or mixture instead of salicylic acid, salicylate of sodium, or quinine in articular rheumatism, typhoid and other fevers; also recommended in dyspepsia, diarrhœa, and intermittent fever. As an antipyretic and antirheumatic remedy it is, however, much inferior to the above-named drugs.

SALIPYRINUM.

Salicylated antipyrine. A coarse, white, crystalline powder, odorless, with a sweetish aromatic taste, readily soluble in water and ether, but with difficulty in alcohol.

Internally employed in doses of gr. xv. every hour, up to ʒ iss. a day, to meet the same indications, as an antipyretic and antirheumatic, as antipyrine and salicylic acid. Profuse sweating usually accompanies the lowering of the temperature and pulse, and sometimes a papular or urticaria-like eruption is produced.

SALOLUM.

Antipyretic, antiseptic. A phenyl salicylate, containing forty per cent phenol and sixty per cent salicylic acid. It occurs in the form of a white, crystalline powder, of a faintly aromatic odor and taste, almost insoluble in water, but soluble in 10 parts of alcohol and 0.3 part of ether. Salol has almost the same action as salicylic acid (it also stains the urine a dark green), but very few or none of its unpleasant incidental effects.

Internally employed in doses of gr. iss.–iij. for summer diarrhœa of children; and for adults, in doses of gr. viij.–xv. (ʒ i.–ij. a day taken in the course of from five to eight hours) in powder flavored with oil of peppermint, wafers, capsules, or tablets, in acute and especially chronic articular and muscular rheumatism. The after-treatment consists in the administration of ʒ ij. down to ʒ ss. a day. Salol has been furthermore warmly praised as an antiseptic in general, especially in phthisis, intestinal catarrh, etc., in doses of gr. viij.; and also in small doses internally in vesical catarrh, as it renders the urine acid and reduces the amount of its contained pus.

Externally it is used as a disinfectant dusting powder (1 part to 10 of starch) in bad-looking, slow-healing ulcers of every sort; for insufflation in ozæna and otorrhœa; as an injection in gonorrhœa in the form of an emulsion containing salol ʒ iiss., acacia ʒ i., and water ʒ iij. An ointment is made of the strength of ten per cent; and it is also used as a mouth wash and dentifrice, especially when caries of the teeth exists (see formula).

℞ Saloli, ... ʒ iss.
Tr. coccionell., ... ʒ i.
Ol. menth. pip., ... gtt. ij.
Ol. rosæ, ... gtt. i.
Alcohol. diluti, ... ʒ iij.

M. S. A teaspoonful in a glass of tepid water, as a mouth-wash and dentifrice in cases of caries of the teeth.

℞ Saloli,
Liq. calcis,
Ol. olivæ, ... āā ʒ ij.

M. S. For application to burns.

℞ Saloli, ... ʒ i.
Ætheris, ... ʒ i.
Cocain. hydrochlor., ... gr. iij.
Collodii flexilis, ... ʒ v.

M. S. For application, by painting with a brush, to sore nipples.

SALVIA.

A weak astringent.

Internally employed in infusion of 10 to 15 parts in 200, often with red wine. A glass of sage tea is a common domestic remedy for night sweats, and to dry up the secretion of milk.

Externally employed as an astringent mouth wash and gargle, and as a lotion in profuse sweating.

Oleum Salviæ.—*Internally* exhibited in doses of 1 to 3 drops several times a day for the same purposes as the leaves. It is also used in tooth powders and confections.

SAMBUCUS.

Elder flowers are employed as a domestic remedy in infusion of ʒ i.–iiss. in ℥ iij.–v. to produce diaphoresis, and also form a constituent of various diaphoretic "species."

Succus Sambuci Inspissatus.—The inspissated juice of the berries mixed with sugar. It is given in doses of a teaspoonful alone or mixed with diaphoretic mixtures in the proportion of ʒ iv.–v. to ℥ v.

SANTALUM.

See Oleum Santali.

SANTONICA.

Cina or Levant wormseed (the unexpanded flowers of Artemisia maritima) contains the active principle santonin, which is quickly fatal to Ascaris lumbricoides and exerts a less marked toxic effect upon other varieties of intestinal worms; it imparts a yellow color to the urine, and in large doses (gr. viij. in adults, gr. ij. in young children) may cause toxic symptoms, such as nausea and vomiting, headache, marked muscular weakness, sopor, icterus, xanthopsia with

mydriasis and amblyopia, and sometimes convulsions and death. For the convulsions inhalation of ether and artificial respiration are recommended; and, after the immediate danger is over, chloral in moderate doses, laxatives, and the copious ingestion of fluids.

Santonica may be given in crude form in doses of gr. viij.–xxx., in powder or electuary, but the following preparation is much to be preferred.

Santoninum.—*Internally* employed in doses of gr. ss.–iss. (maximum dose, gr. viij. pro die) in powder or pastilles morning and evening for three days, followed by a laxative on the fourth; or combined with castor oil (gr. iss.–iij. to ℥ ij.; dose, one teaspoonful three times a day).

Trochisci Santonini.—The santonin troches of the B. Ph. contain each 1 grain of santonin. The Trochisci Sodii Santoninatis of the U. S. Ph. are not to be recommended.

℞ Pulv. santonicæ,
Pulv. jalapæ, ... āā ʒ i.
Syr. simplicis, ... ʒ v.
M. et ft. electuarium. S. To be taken in three doses, one each evening. (For lumbricoid worms.)

℞ Santonini,
Hydrarg. chlor. mitis, ... āā gr. v.
Pulv. rhei, ... ʒ ss.
Sacchari, ... ʒ iss.
M. et div. in chart. No. 10. S. One powder three times a day. (For lumbricoid worms.)

SAPONES.

Soaps are combinations, resembling salts, of a fat (seldom a resin) with a (usually alkaline) base. See also Mollinum.

Sapo Jalapinus.—Composed of resin of jalap and hard soap, each 4 parts, alcohol 8 parts. It is given internally in doses of gr. iss.–v. as an intestinal irritant, of gr. v.–xxx. as a purgative, several times a day alone or in combination with other laxative remedies, such as aloes, calomel, etc.

Sapo Viridis.—Caustic potassa, 27 parts; linseed oil, 20 parts; alcohol, 2 parts. Employed in baths (℥ v.–viij. for a full bath), and by friction in various skin diseases, such as chronic eczema, psoriasis, itch, etc.

Sapo Viridis Venalis.—Ordinary soft soap, made with inferior fats of all kinds and potash lye. It is employed to soften the epidermis and thus assist the action of remedies used to destroy the itch-mite, and by itself in the treatment of itch. It sometimes causes a scarlatiniform dermatitis followed not rarely by acute nephritis.

Sapo Medicatus Pulveratus.—A mixture of caustic soda, 120 parts; lard and olive oil, each 20 parts; alcohol, 12 parts; water, 200 parts; chloride of sodium, 25 parts; and carbonate of sodium, 3 parts.

It is used internally in pills (a few drops of alcohol or mucilage of acacia will give the soap a proper consistency), alone or in combination with laxatives. It is also given by enema and suppository.

Spiritus Saponatus.—Olive oil, 6 parts; caustic potash, 7 parts; alcohol, 30 parts; water, 17 parts.

Externally employed as a domestic remedy for rubbing on contusions and sprains, for washing the scalp and face in psoriasis, and as an addition to baths.

The super-fatted soaps are neutral and unirritating, and are therefore usually employed as the basis for medicinal soaps, containing tar, carbolic acid, thymol, corrosive sublimate, etc.

℞ Sapon. viridis, ... ℥ ij.
Alcohol. dilut., ... ℥ i.
Filtra et adde
Spt. lavandulæ, ... ʒ ij.
M. S. Tincture of green soap. For washing the parts in obstinate psoriasis.

℞ Sapon. viridis, ... ℥ i.
Sulphur. flor., ... ℥ ss.
Aq. destillat., ... q.s.
M. et ft. unguentum molle. S. To be rubbed on the parts three times a day. (Scabies.)

℞ Pulv. rhei,
Sapon. medicat., ... āā ʒ i.
Alcohol (or Mucil. acaciæ), . . . q.s.
M. et ft. pil. No. 60. S. From two to four pills three times a day.

SARSAPARILLA.

Although sarsaparilla is far inferior to iodine or mercury in the treatment of syphilis, nevertheless (especially in the form of Zittmann's decoction) it has always been employed for this purpose, and of late it is being still more often used. Its curative action is, indeed, not a specific one, but is to be referred rather to the increased elimination through the skin, kidneys, and intestine which it brings about. It is frequently combined with diuretics and cathartics (senna).

Decoctum Sarsaparillæ Compositum.—Composed of sarsaparilla, 10 parts; sassafras, guaiac wood, and licorice root, each 2 parts; mezereum, 1 part; and water, q.s. to make 100 parts. The dose is from one to four fluid ounces. The diet should be moderate and unstimulating.

Decoctum Zittmanni.—This is the strongest compound decoction of sarsaparilla of the Ph. G. (composed of 20 parts sarsaparilla, 2 of licorice, 5 of senna, and 1 each of sugar, anise, fennel, and alum, in 520 parts of water) to which has been added 4 parts of calomel and 1 part of mercuric sulphide, and is employed in syphilis.

℞ Decoct. sarsaparillæ comp., . . . ℥ v.
Potassii iodidi, ... ʒ ij.
Hydrarg. iodidi rubri, ... gr. iss.
Syr. simplicis, ... ʒ v.
M. S. One tablespoonful three times a day. ("Ricord's mixture" for tertiary syphilis.)

℞ Potassi bitartr., ... ʒ iv.
Sodii boratis, ... ʒ iiss.
Pulv. levistici,
Pulv. ononidis spinosæ,
Pulv. sassafras., ... āā ʒ vi.
M. et ft. species. S. A tablespoonful added to three glassfuls of water and boiled down to two. (Species diureticæ.)

SASSAFRAS.

Internally employed in doses of gr. viij.–xxx. in powder or infusion (ʒ iiss.–iv. in ℥ v.), usually in combination with sarsaparilla.

SATURATIO.

This is the term applied to a solution of a simple alkaline carbonate (usually potassium, more rarely sodium) in water with the addition of one of the organic acids (acetate, citrate, or tartrate) stronger than carbonic acid. The normal saturation proportions of various substances are given in the section under Acidum Citricum.

The German Pharmacopœia directs that the potio Riveri be dispensed when a saturation, without definite direction as to the ingredients, is ordered. (See Sodii Carbonas for the composition of Potio Riveri.)

SCILLA.

A diuretic (or, when the diuretic action is absent, a cathartic) and expectorant. Compare digitalis, with which squill is sometimes given in combination.

Internally employed in doses of gr. ss.–iss. up to the maximum dose of gr. iij. (or gr. xv. per day), best in infusion or decoction (one to three per cent), but not as a powder, as it is very hygroscopic, as a diuretic in congestive dropsy, often combined with digitalis. It should not be given in nephritis or when the digestion is greatly disordered. Large doses sometimes excite vomiting, diarrhœa, renal irritation, and hæmaturia.

Acetum Scillæ.—A ten-per-cent maceration of squill in vinegar. Internally employed in doses of 10 to 30 drops several times a day (maximum, ʒ v. pro die) in sweetened water, or better in mixtures and saturations. Also used in gargles and in enema.

Extractum Scillæ Fluidum.—Given in doses of ♏ v.–xxx. several times a day.

Oxymel Scillæ.—Composed of vinegar of squill 1 part, and purified honey 2 parts, evaporated down to 2 parts. Internally employed in doses of one to two teaspooonfuls as an emetic for children, and as an expectorant and diuretic; in mixtures (ten to thirty per cent); and as an addition to emetic, expectorant, diuretic, and anthelmintic preparations.

Tinctura Scillæ.—Contains the active properties of 15 parts of squill in 100 of alcohol. Dose: gtt. x.–xx.

℞ Scillæ, ... gr. xlv.
(Digitalis, ... gr. xv.)
Aq. calient., ... ℥ iv.
Liq. potass. acetat.,
Succi juniperis, ... āā ʒ vi.
Syr. simplicis, ... ℥ ss.

M. S. A tablespoonful every two hours. (A powerful diuretic.)

℞ Scillæ, ... ʒ ij.
Digitalis, ... ʒ i.
Juniperis, ... ʒ iij.
Vini albi, ... ℥ xij.

Macera per horas 48, adde

Syr. aurant. cort., ... ʒ x.

M. S. A tablespoonful from three to five times a day. (Diuretic wine.)

℞ Infus. scillæ (1½%), ... ℥ v.
Sodii bicarb., ... ʒ i.
Acid. citric., q.s. ad saturationem.
Syr. aurant. cort., ... ʒ v.

M. S. A tablespoonful every two hours. (Diuretic.) To be kept on ice.

℞ Scillæ pulv.,
Digitalis pulv., ... āā gr. viij.
Ext. trifol. fibrin., ... q.s.

M. et ft. pil. No. 10. S. One pill every two hours until five have been taken.

℞ Acet. scillæ, ... ℥ i.
Potass. carb., q.s., ad saturationem.
Aq. petroselini, ... ℥ v.
Sp. æther. nitrosi, ... ℥ i.
Elæosacch. juniperis, ... ℥ i.

M. S. A tablespoonful every two to three hours. (Diuretic saturation.)

℞ Vini scillæ, ... ℥ ss.–i.
Potion. Riveri, ... ℥ iv.
Aq. amygdal. amar., ... ʒ i.
Syr. limonis, ... q.s.

M. S. A tablespoonful every hour. (Dropsy from heart disease or granular nephritis.) Keep the bottle on ice.

SEBUM OVILE (BOVINUM).

Mutton or beef suet, a firm fat containing a large proportion of stearin. It is used as a base for white, firm ointments.

SECALE CORNUTUM.

See Ergota.

SENEGA.

A strong expectorant, producing cough, which is used in bronchorrhœa, accumulation of mucus (moist râles) in the second stage of bronchial catarrhs and in the resolvent stage of pneumonia, especially in aged and marasmic people; also in vesical catarrh.

Internally employed in doses of gr. viij.–xxx. several times a day, rarely in powder, but more commonly in infusion or decoction (℥ i.–iiss. in ℥ v. water). It should not be given in phthisis, when there is high fever, or when the digestion is disordered.

Extractum Senegæ Fluidum.—Given in doses of 10 to 20 drops as an ingredient of expectorant mixtures.

Syrupus Senegæ.—Used with other expectorants in doses of ℥ ss.–i.

℞ Decoct. senegæ (5%), ... ℥ v.
Potassii iodidi, ... ℥ ij.
Syr. simplicis, ... ℥ v.
M. S. A tablespoonful three times a day. (Asthma.)

℞ Infus. senegæ (senegæ, ℥ iiss.), . . . ℥ v.
Liq. ammon. anisat., ... ℥ ss.
(Tr. opii camph., ... ℥ i.)
Syr. althææ, ... ℥ v.
M. S. A tablespoonful every two hours.

SENNA.

The leaflets of Cassia acutifolia and elongata. A safe, mild cathartic, free from any evil effects other than colicky pains, which may be prevented or rendered unimportant by the addition of a little almond water or by giving the alcoholic extract or the species laxantes. The drug should not be given in inflammatory conditions of the intestines.

Internally employed in doses of gr. v.–viij. several times a day as a intestinal stimulant; gr. viij.–xxiv. once or twice a day as a mild laxative; and ʒ ss.–i. as a purgative, usually in infusion (ʒ i.–iiss. in ℥ v.), more rarely in powder, pill, or confection. A domestic laxative tea is made by adding one-half to one tablespoonful of senna leaves with a teaspoonful of fennel or caraway seeds to a glass of boiling water.

Species Laxantes.—St. Germain tea. Composed of senna leaves, 16; elder flowers, 10; anise and fennel seeds, each 5; tartrate of potassium, 2.5; and tartaric acid, 1.5 parts. It is used in quantity of one to two tablespoonfuls for a glass of tea.

Confectio Sennæ.—Composed of senna, 10 parts; coriander, 6; cassia fistula, 16; tamarind, 10; prune, 7; fig, 12; sugar, 50; and water, 60 parts; evaporated down to 100 parts. Dose: ʒ ij.

Infusum Sennæ Compositum.—Vienna laxative. Composed of infusion of senna (10:70), 70 parts; tartrate of sodium, 10 parts; manna, 30 parts. Given in doses of a teaspoonful to a tablespoonful several times a day as a mild laxative, of two tablespoonfuls or more (for children a teaspoonful with syrup) as an active laxative. It is also used as an ingredient of extemporaneous mixtures.

Syrupus Sennæ.—Dose: A dessertspoonful to a tablespoonful.

Acidum Cathartinicum.—Derived from senna. *Internally* employed for children in doses of gr. iss.–iij., for adults gr. v.–viij., two or three times a day in mixtures, pills, or powder with carbonate of magnesium and sugar of milk. It acts as a purgative, with tolerable rapidity, and is free from the colicky effects of senna. It is mildly laxative when given by hypodermic injection in doses of gr. iij.–v. The solution for this purpose must, however, be made alkaline, otherwise inflammation of the skin, and abscesses, may be produced.

℞ Sennæ pulv., ... ʒ iv.
Potass. bitart.,
Pulv. rhei, ... āā ʒ i.
Elæosacch. limonis, ... ʒ ss.
Sacch. albi, ... ʒ v.
M. S. A tablespoonful in the morning in a little milk.

℞ Infusi sennæ (sennæ, ʒ iiss.), . . . ℥ v.
Sodii tartratis, ... ʒ v.
Syr. sennæ, ... ℥ ss.

M. S. A dessertspoonful to a tablespoonful every thirty to sixty minutes.

℞ Confect. mannæ, ... ʒ iiss.
Aq. destillatæ, ... ʒ vi.
Pulv. sennæ, ... ʒ vi.
Sulphur. loti, ... ʒ ss.
Tamarindi, ... ʒ i.
Pulv. zingiberis, ... gr. xv.

M. et ft. confectio. S. A teaspoonful two or three times a day.

SINAPIS NIGRA.

Mustard is scarcely ever given internally in medicine. *Externally* it is used in sinapisms mixed with about equal volume of tolerably hot water, and applied to the skin with a piece of fine-meshed gauze intervening, to produce counter-irritation (in cases of syncope, colicky and other pains, etc.). The use of cold, as well as of boiling, water in the preparation of a mustard plaster is less efficacious than that of moderately hot water, as the latter extracts the irritating ethereal oil more readily.

Charta Sinapis.—Mustard paper is prepared by spreading a mixture of black mustard, benzin, and solution of gutta-percha on stiff, well-sized paper. It is moistened in warm water and applied to the skin for the same purposes as the mustard plaster.

Oleum Sinapis.—Is added in small quantities to irritating liniments, or applied (cautiously) pure.

Spiritus Sinapis.—A piece of blotting-paper repeatedly moistened in mustard spirit is applied to the skin to produce the same effects as those obtained by the mustard plaster or paper.

SODIUM.

The preparations of sodium have not the toxic properties of those of potassium. The carbonates are changed in the stomach into lactates, free carbonic acid being liberated.

SODII ACETAS.

Internally given in doses of ʒ iiss.–iv. and more a day, in solution, as a diuretic in acute and chronic nephritis, being at the same time mildly laxative.

SODII ARSENIAS.

See Acidum Arseniosum.

SODII BENZOAS.

Internally employed in single doses of gr. iss.–xv., up to ʒ ij.–iiss. or more a day, in solution or pill, in the uric-acid diathesis and uric-acid concretions, and in acute rheumatism. The remedy has not sustained the claims made for it in the treatment of tuberculosis, various intestinal affections, and uræmia.

It is also used in spray inhalations of a five-per-cent solution as an expectorant.

SODII BICARBONAS.

It should not be given with acids or metallic salts, nor for any length of time in very large doses immediately before or after eating. (Compare calcii, magnesii, and potassii carbonas, and acidum carbonicum.)

Internally given in doses of gr. viij.–xxx. several times a day, in powder, effervescing powder, troches, solutions in aromatic waters, and effervescent draughts, as an antacid in heartburn, acute and chronic gastric and intestinal catarrhs, obstinate vomiting, catarrhal jaundice and cholelithiasis (Carlsbad, Marienbad, and Vichy waters); in uric-acid concretions and gout, as it renders the urine alkaline); in chronic cystitis in doses of ʒ i.–ij. per day (Ems, Vichy, Wildungen, Carlsbad waters); to loosen the expectoration in chronic bronchial catarrhs (Ems and Salzbrunn waters), but not to be given in phthisis; and in doses of a teaspoonful at bed-time, to prevent wetting the bed.

Inhalations of a one-half to one per cent spray are used in chronic bronchitis. And for washing out the stomach a one-half to two per cent solution is employed.

Externally applied as a wash to the scalp (ʒ i.–ij. in ℥ vi.

water) in alopecia. Fresh burns and scalds should be immediately dusted thickly with bicarbonate of sodium and then covered with moist cloths.

Pulvis Effervescens (Aerophorus).—Composed of bicarbonate of sodium, 10 parts; tartaric acid, 9 parts; sugar, 19 parts.

Pulvis Effervescens Compositus.—Seidlitz powder. Composed of 40 grains of bicarbonate of sodium and 120 grains of tartrate of potassium and sodium, thoroughly mixed and wrapped in a blue paper; and 35 grains of tartaric acid in a white paper.

Trochisci Sodii Bicarbonatis.—Each contain 3 grains of bicarbonate of sodium, with sugar and a little nutmeg.

℞ Sodii bicarb., ... gr. xv.
Mucil. acaciæ,
Aq. destillatæ, ... āā ℥ iss.
Tr. rhei, ... ʒ ss.
Syr. aurant. cort., ... ʒ vi.
M. S. A teaspoonful every hour or two. Vomiting and diarrhœa of small children, due to excessive acidity of the primæ viæ.

℞ Morph. hydrochlor., ... gr. i.
Sodii bicarbonatis, ... gr. xlv.
Elæosacch. cinnamomi, ... ʒ ss.
M. et div. in chart. No. 6. S. One powder every three or four hours, in diarrhœa or cholerine.

℞ Sodii bicarb.,
Bismuth. subcarb.,
Sacch. albi, ... āā ʒ iiss.
Pulv. calami, ... ʒ iss.
M. S. As much as can be taken on the point of a knife three times a day. (Chronic gastric catarrh, pyrosis.)

℞ Sodii bicarb.,
Sodii chloridi, ... āā gr. xxiv.
Morph. hydrochlor., ... gr. i.
Aq. destillatæ, ... ℥ vij.
M. S. For spray inhalation twice a day in spasmodic asthma. Also to loosen the expectoration in catarrhal bronchitis and phthisis.

SODII BORAS.

Borax. Soluble in 14 parts of water.

Internally recommended in doses of gr. xv.–xxx. three or four times a day in dysmenorrhœa, and as an emmenagogue and abortifacient.

Externally employed as a mild astringent in collyria, mouth washes and gargles (1 to 5 parts in 100; avoid solutions with mucilaginous substances), or in four-per-cent (non-saccharine) solution as an application in spruc. Relief is often obtained in pruritus vulvæ by washing the parts with a pint of warm water to which is added a teaspoonful of powdered borax and 5 drops of oil of peppermint. It is also used for inhalations and injections into the nostrils in light forms of chronic catarrh, and as an application in many skin diseases.

℞ Sodii borat., ... ʒ i.
Glycerini (or Mel. despumat.), . . . ʒ v.
M. S. For painting the buccal mucous membrane in aphthæ, or the pharynx, larynx, or nasal cavities in a mild chronic catarrh.

℞ Sodii boratis, ... ℥ v.
Sp. vini rectif.,
Aq. rosæ, ... āā ℥ iv.
M. S. For dandruff.

℞ Extr. opii, ... gr. xv.
Sodii boratis, ... ʒ i.
Mel. despumat., ... ʒ v.
Infus. salviæ flor., ... ℥ vij.
M. S. For a gargle in painful sore throat.

℞ Sodii boratis,
Acid. salicyl., ... āā ʒ i.
Aq. destillatæ, ... ℥ vi.
M. S. For inhalation.

SODII BROMIDUM.

Possesses the same action as bromide of potassium, but is said not to cause heart weakness, etc., and is therefore to be preferred in the case of children (see Potassii Bromidi).

SODII CARBOLAS.

Antiseptic. See Liquor Sodii Carbolatis, under Acidum Carbolicum.

SODII CARBONAS.

Internally employed in doses of gr. viij.–xx. like the bicarbonate, which is preferable. The dried carbonate is employed only in powder.

Externally used like the bicarbonate; a solution of gr. lxxv. to ℥ iss. of water may be injected into the ear to soften plugs of cerumen; a nasal douche in coryza may be made of a one-per-cent solution; solutions may also be employed for washing out the bladder. Inhalations in spray of a one-half to one per cent solution are used in pharyngitis with a formation of mucous crusts, but the remedy is not to be recommended in simple dry catarrh.

Potio Riveri.—Composed of citric acid, 4 parts; water, 190; carbonate of sodium, 9; syrup of lemon, 30. It is given in doses of a tablespoonful as an antacid.

℞ Sodii carbonatis exsiccat.,
Pulv. rhei, ... āā ʒ i.
Pulv. gentianæ, ... ʒ ij.
Elæosacch. macidis, ... ʒ ss.

M. et ft. pulvis. S. To be taken in doses of as much as can be lifted on the point of a knife. A stomachic and digestive.

℞ Sodii carb., ... ʒ v.
Aq. rosæ, ... ℥ iiij.
Filtra et adde
Glycerini, ... ʒ v.

M. S. To be used as a wash three times a day to chapped skin.

SODII CHLORIDUM.

Internally occasionally employed: 1. As a domestic remedy for hæmoptysis. Finely powdered salt may also be given in doses of a teaspoonful, dry or in a little water, to neutralize a piece of nitrate of silver that may have been swallowed, or to kill leeches that have passed down the œsophagus.

2. Is used dietetically as a digestive, here usually and best in the form of natural saline waters, to increase the digestibility especially of fatty foods; and also in acute and chronic gastric catarrh.

3. In bronchial and laryngeal catarrhs, scrofula, and rheumatism (saline mineral waters).

4. In epilepsy given at the appearance of the aura. Also recommended in doses up to ʒ x. a day in the treatment of pleurisy with effusion and other acute inflammations of the serous membranes.

Externally it is added in doses of a teaspoonful to two tablespoonfuls to laxative enemas. Employed in baths (two to six pounds to the bath) as a gentle cutaneous irritant, and also in lotions. For syringing out poisoned wounds, and to neutralize nitrate of silver.

A spray (chloride and carbonate of sodium, each gr. xl.; muriate of morphine, gr. ij.; and water, ℥ x.) is used with good effect in various chronic catarrhal conditions of the pharynx, larynx, and bronchi.

In nasal catarrhs a one to two per cent solution may be snuffed up into the nose.

Salt (in the so-called physiological salt-solution—chloride of sodium 0.6%, and carbonate of sodium 0.1%) is used subcutaneously and by transfusion in Asiatic cholera.

SODII CHLORAS.

Internally and externally used like chlorate of potassium.

SODII DITHIOSALICYLAS.

Internally employed in doses of gr. iij. four times a day, in wafers because of its unpleasant odor, in acute muscular and articular rheumatism. It is said to have the same therapeutic effect (but not to cause the sweating and the disagreeable gastric symptoms) as salicylate of sodium.

SODII HIPPURAS.

Internally employed in doses of gr. viij.–xv. in warm solution. It is said to cause the disappearance of uric acid and the urates.

℞ Sodii hippuratis, ... gr. lxxv.
Lithii carb., ... gr. xxij.
Glycerini, ... ℥ ss.
Aq. cinnamomi, ... ℥ vi.
M. S. One or two tablespoonfuls for a dose.

℞ Sodii hippuratis, ... ʒ ij.
Potass. nitratis, ... ʒ iij.
Aq. menth. pip., ... ℥ iv.
Syr. simplicis, ... ʒ vi.
M. S. One teaspoonful four times a day.

SODII IODIDUM.

Is employed like the potassium salt and is to be preferred to it for long administration.

SODII LACTAS.

Hypnotic. Resembles castor oil in appearance.

Internally employed in doses of ʒ iiss.–℥ ij. at a time or in divided portions, in sweetened water on an empty stomach, it is said to control excitement and produce sleep. It may also be given by the rectum.

SODII NITRAS.

Internally employed, like the corresponding potassium salt, in doses of gr. viij.–xv. several times a day, in powder or solution, as a cooling drink in fevers. It has even less effect upon the pulse and temperature than nitrate of potassium, but causes less gastric disturbance and is devoid of danger.

SODII NITRIS.

Nitrite of sodium is a powerful cardiac poison, like nitrite of amyl and nitroglycerin, and is employed to meet the same indications and in the same dose, but it is said not to produce the unpleasant incidental effects in as marked a degree as nitroglycerin; but at the same time it must be used with great caution.

Internally given in doses of gr. i.–iss., or at most gr. ij. A teaspoonful may be given four times a day, the last dose at bed-time, of a solution of ʒ ss. in ℥ iv. of water.

SODII PHOSPHAS.

Given in doses of ℥ ss.–i. in ℥ iij.–iv. of water, in one or two portions, as a laxative; and gr. viij.–xxx. several times a day in gout and urinary calculus.

SODII PYROPHOSPHAS.

Is occasionally given internally for the same purposes as the phosphate (see Ferri et Sodii Pyrophosphas).

SODII SALICYLAS.

White odorless scales, or a white powder, of a sweetish saline taste, soluble in 0.9 part of water and 6 parts of alcohol. See Acidum Salicylicum, which it resembles in action, indications, and dosage.

Internally given as a powder in wafers, or in a solution with plenty of syrup of orange peel. In addition to the indications which it has in common with salicylic acid, it is especially recommended for migraine in two doses of gr. xx. each, in wafers, fifteen minutes apart; if it is necessary to give it for a longer period, it may be combined with a small quantity of opium or morphine. In acute rheumatism it is exhibited in doses of gr. xv.–xxx. from five to seven times a day; or gr. lxxv. at once and repeated in the same dose the following day. It is also employed in large doses combined with gr. $\frac{1}{120}$ of atropine three times a day, for urticaria; ichthyol (*q.v.*) being at the same time applied externally, if necessary. In epidemic cerebro-spinal meningitis it is given in doses of gr. lxxv.–xc. Finally, it is strongly recommended, in doses of two tablespoonfuls of a three-per-cent solution three times a day, for general cutaneous pruritus.

SODII SILICAS.

Soluble glass, a solution of silicate sodium, a viscid fluid of syrupy consistence, is employed externally, applied by means of a brush, as a protective covering in erysipelas, for mosquito and bee strings, and in joint troubles. But its principal application is in the formation of splints for fractures,

dislocations, diseased joints, etc., in place of plaster of Paris or starch. Bandages soaked in the solution and then lightly squeezed are applied evenly about the parts, and when dry form a firm and immovable dressing.

SODII SOZOIODOLAS.

See Sozoiodolum.

SODII SULPHAS.

Glauber's salt. When deprived of its water of crystallization, it loses half its weight and is twice as active as the ordinary salt. The dried sulphate should always be used when powders are prescribed. Its use should be avoided in inflammatory conditions of the stomach and intestine, and in cachectic states.

Internally employed in doses of 40 to 80 grains (one-half to one tablespoonful), at once or dissolved in a pint of water and slowly sipped during the course of an hour, as a quickly acting laxative, which is free from any unpleasant effects. It is given in chronic constipation, ulcer of the stomach, benign hepatic disorders, diabetes, gout, obesity, etc. The best form of administration is as Carlsbad salt (see below), or in the natural Carlsbad or Marienbad, or other waters containing it.

As an antidote in poisoning by carbolic acid or lead (acute), it is given in doses of gr. xv.–lxxv. several times a day (a tablespoonful every two hours of a solution containing ʒ ss. in ℥ v. water and ℥ i. simple syrup).

Sal Carolinum Factitium.—Artificial Carlsbad salt contains dried sulphate of sodium, 22 parts; sulphate of potassium, 1; chloride of sodium, 9; bicarbonate of sodium, 18 parts. It is taken dissolved in warm water, fasting, and ʒ iss. dissolved in two pints of water has the same effect as the natural Carlsbad water. A teaspoonful to a tablespoonful (a little experience will tell the patient how much is necessary to produce one or two soft stools) is dissolved in a pint of tepid water, and is taken fasting in the course of fifteen and thirty minutes; then an hour later breakfast is taken, the patient in the meanwhile exercising more or less, as may be possible. (The more expensive natural Carlsbad salt possesses no advantage over this artificial product.)

℞ Sodii sulphat., ... ʒ iiss.
Syr. mannæ, ... ʒ v.
Decoct. frangulæ (Frangulæ, ʒ iiss.), . ℥ iij.
M. S. A tablespoonful every hour until the bowels move.

℞ Sodii sulphat., ... ʒ vi.
Acidi tartar., ... gr. iv.
Aq. destill., ... ℥ v.
Syr. rhamni cathart., ... ʒ vi.
M. S. A tablespoonful every hour until the bowels move.

℞ Sodii sulphatis exsiccat., ... ʒ iiss.
Sulphur. loti,
Potass. bitartr., ... āā ʒ v.
Elæosacch. limonis, ... ʒ i.
M. et ft. pulvis. S. A teaspoonful two or three times a day. (For hemorrhoids.)

℞ Sodii sulphatis, ... ℥ i.
Acaciæ, ... ʒ iiss.
Aq. destillatæ, ... ℥ v.
Ol. ricini, ... ʒ iv.
Extr. belladonnæ, ... gr. iiss.
M. S. A tablespoonful every hour. (Lead colic.)

SODII SULPHO-ICHTHYOLAS.

See Ichthyolum.

SODII TANNAS.

See Acidum Tannicum.

SOLANINÆ HYDROCHLORAS.

Obtained from several species of the Solanum, especially from dulcamara, belonging to the same class of alkaloids as atropine, eserine, etc.

Internally employed (with care, as it is poisonous) in doses of gr. i.–iss. (gr. iv. a day) morning, noon, and night in wafers or pills (each containing gr. $\frac{1}{6}$) for sciatica. In neuralgia, gr. iij. may be taken the first day, gr. v. the second, and gr. vi. the fourth, in pills. In somewhat smaller doses (gr. ij.–iv.), it is used for tic douloureux, neuritis, prurigo, cystitis, bronchitis, muscular and articular rheumatism, and vomiting of pregnancy.

It is given subcutaneously, in one-per-cent solution, for sciatica and neuralgia, in doses of gr. ss.–i. from one to three times a day.

SOLVINUM.

Polysolve or solvin is a product of the action of concentrated sulphuric acid on the fatty acids of castor, almond, or rape-seed oil. It is an excellent solvent for many substances which are insoluble in water, and has, therefore, been recommended as an excipient for internal remedies and as an emulgent for ointments externally. Unfortunately, however, the early claims for its universal solvent property, and also for its safety in internal and external use have not been sustained. Toxic symptoms, such as ecchymoses, ulceration, and inflammation, have not infrequently been seen to follow its use, and it is, therefore, better not to employ it.

SOMNALUM.

Somnal is an alcoholic solution of chloral hydrate and ethylacethan. Hypnotic.

Internally employed in doses of ʒ ss. in mixture (see formula), or in beer, wine, etc., is said to produce, within about half an hour, a quiet sleep of six to eight hours' duration, without causing any unpleasant incidental effects.

℞ Somnali, ... ʒ iiss.
Syr. rubi idæi (or Ext. glycyrrh.), . . ʒ v.
Aq. destillatæ, ... ℥ iss.
M. S. A tablespoonful at bed-time.

SOZOIODOLUM.

Sozoiodolic acid. The sozoiodolates (the acid itself is not used) exercise a specific action in diseases of the skin and mucous membranes, in that they cause a non-inflammatory exfoliation. They affect favorably the parasitic diseases, and also are recommended as a substitute for iodoform, of which they possess none of the incidental toxic properties. Concentrated solutions restrain the growth of schizomycetes; and a two-per-cent solution of sodium sozoiodolate prevents the development of Staphylococcus pyogenes.

Potassii Sozoiodolas.—Contains fifty-five per cent iodine, seven per cent sulphur, and twenty per cent carbolic acid. It occurs in the form of colorless and odorless crystals, soluble only in 50 parts of water.

Sodii Sozoiodolas.—Similar in appearance to the preceding, but more soluble (in 13 to 14 parts) in water.

Externally these two salts are employed indifferently, in ten-per-cent ointment with vaselin, in eczema, sycosis, herpes tonsurans, etc., and as a dusting powder to unhealthy ulcers (when there is profuse suppuration, the potassium salt is preferable); in powder insufflated into the nose to destroy the fetor in ozæna, and as an application to tuberculous ulcers of the larynx (preferably the sodium salt in this case).

Hydrargyri Sozoiodolas.—A yellow powder, scarcely soluble in water, but readily soluble in a chloride of sodium solution.

Externally employed in five-per-cent ointment, like the preceding, in syphilitic affections; as a powder (1 part to 20 of talc) for insufflation in nasal syphilis. It is also given by subcutaneous injection (♏ xv. of a five to ten per cent solution injected into the glutei every second or third day) in the treatment of syphilis, about fifteen injections in all sufficing.

Zinci Sozoiodolas.—Occurs in the form of white needles, readily soluble in water. *Externally* used in ten-per-cent ointments and powders, like the other salts, but preferred in those cases in which there is but little secretion.

SPARTEINÆ SULPHAS.

The sulphate of an alkaloid derived from the tops of Spartium scoparium. It occurs in the form of colorless, needle-shaped crystals, easily soluble in water, and of an intensely bitter taste. It acts upon the central nervous system, and in large doses may cause death. It resembles digitalis in its effects, though it is not a true succedaneum for it, acting more rapidly though less energetically. It rapidly and markedly slows the pulse, increases the energy of the cardiac contractions, prolongs the systole, and also causes diuresis. It is, therefore, indicated in affections of the heart muscle, whether degenerative or atonic, and also in cases of irregular, intermittent, or slow pulse, when digitalis, strophanthus, and caffeine have failed to produce the desired effect.

Internally given in doses of gr. $\frac{1}{60}$ to $\frac{1}{3}$, carefully increased up to gr. i.–iss. a day, in pill or solution. The dosage and action of the remedy are not, however, as yet well settled.

℞ Sparteinæ sulphatis, ... gr. vi.
Pulv. glycyrrhizæ,
Ext. glycyrrhizæ, ... āā q.s.
M. et ft. pil. No. 20. S. One pill from two to four times a day.

℞ Spartein. sulph., ... gr. iij.
Syr. aurant. cort., ... ℥ iij.
M. S. A dessertspoonful in water from two to four times a day.

SPECIES.

Under this name are understood preparations, consisting of mixtures in coarse powder or small pieces of various plants, which are used to make decoctions and infusions.

Species ad Gargarisma.—Composed of althæa and malva leaves, and elder flowers.

Species Aromaticæ.—Composed of 1 part each of cubebs and cloves, and 2 parts each of peppermint leaves, sweet thyme, lavender flowers, and wild thyme. It is used to make aromatic baths (one-half pound to the bath), pillows, and poultices.

Species Diureticæ.—See Sarsaparilla.

Species Emollientes.—Composed of equal parts of linseed meal, elder flowers, malva, chamomile, and melilot. Used to make poultices.

Species Laxantes.—St. Germain tea. See Senna.

Species Lignorum.—See Guaiacum.

Species Pectorales.—See Glycyrrhiza.

SPERMINUM HYDROCHLORICUM.

Piperazidin or piperazin. An extract prepared from the testicles of young animals (calves, colts, etc.), which, administered in one to two per cent sterilized solution, is said to exercise a stimulating and rejuvenating effect upon the nervous system, acting especially in the sexual sphere, and increasing the general sense of well-being. It is, however, still in the experimental stage.

Internally recommended in doses of gr. xv. several times a day; or

Subcutaneously in doses of gr. i.–iss. (in three to five per cent solution) as a solvent for uric acid in the uric-acid diathesis, gout, calculi, etc. But it has not yet been sufficiently tried to establish its value in this respect.

SPIRITUS ÆTHERIS COMPOSITUS.

Hoffmann's anodyne. See Æther.

SPIRITUS ÆTHERIS NITROSI.

Sweet spirit of nitre. Composed of nitric acid, 9 parts; sulphuric acid, 7 parts; in alcohol and water. A diuretic.

Internally employed in doses of ʒ ss.–i. several times a day, pure or in mixture with other substances.

SPIRITUS AROMATICUS.

See Melissa.

SPIRITUS MINDERERI.

See Ammonii Acetas.

STRAMONII FOLIA.

A narcotic similar to belladonna. The active principle, daturine, is identical in its action with atropine.

Internally employed in doses of gr. ss. up to the maximum of gr. iij. (gr. xv. a day) in powder or pill, like belladonna; but it is seldom used.

Externally used in the form of stramonium cigarettes (ʒ i. of stramonium leaves wrapped in a tobacco leaf), smoked for the relief of asthma. It must be employed cautiously, only a few whiffs at intervals being taken at first, as the smoke readily induces narcosis. The infusion may also be inhaled in the form of a spray; or the fumes may be inhaled by burning nitre paper soaked in stramonium infusion and dried, or by mixing equal parts of stramonium leaves and nitrate of potassium.

Tinctura Stramonii.—*Internally* employed in doses of ♏ v.–xv. from two to four times a day. Maximum dose: ♏ xv., or ♏ xlv. pro die.

Extractum Stramonii.—*Internally* employed in doses of gr. $\frac{1}{6}$ to i., in powders or pills. Maximum dose: gr. iss., or gr. vi. pro die. [The officinal extract of stramonium (U. S. Ph.) is made from the seed and is stronger than that from the leaves. Dose: gr. $\frac{1}{6}$ to $\frac{1}{2}$.]

STROPHANTHUS.

The powdered seed of Strophanthus hispidus, a climbing plant found in Asia and Africa. It is a cardiac poison, which causes stronger contractions in small doses, but paralyzes the organ in large doses. In moderate doses it is diuretic, and exercises a direct quieting effect upon the nervous system.

It is not a substitute for, but a useful synergist of, digitalis, and as it has no cumulative action it can be given for a long time (*conf.* Digitalis.)

Tinctura Strophanthi.—Ten-per-cent strength.

Internally employed in doses of 2 to 10 drops or more three times a day, up to the maximum dose of ♏ viij., or ʒ ss. a day, for the same indications as digitalis (than which it is more rapid in its action), and usefully given in combination with it in cases of insufficient compensation. The remedy is therefore indicated in pure muscular insufficiency, compensatory disturbances due to valvular disease, to empyema, or to nephritis (with œdema and ascites); in acute heart failure with marked dyspnœa, in severe cases of pneumonia in the aged, etc.

Strophanthinum.—*Internally* recommended in doses of gr. $\frac{1}{30}$ to $\frac{1}{15}$, but it is certainly dangerous, and has been too little tried, and is therefore better not given at present.

STRYCHNINA.

See Nux Vomica.

STYRAX.

Storax. A cheap but efficient remedy for scabies and pediculosis pubis, mixed with $\frac{1}{4}$ to 1 part olive oil, $\frac{1}{2}$ part glycerin, or equal parts balsam of Peru.

℞ Styracis,
Bals. peruv., ... āā ʒss.
M. S. For rubbing into the parts in scabies, especially in children.

℞ Styracis, ... ℥ iss.
Bals. peruvian., ... ℥ i.
Ol. olivæ, ... ℥ i.
Alcohol., ... ℥ ss.

M. et ft. linimentum. S. To be employed for thorough rubbing three or four times.

SUCCUS PANCREATICUS.

(*Conf.* Caro.) An artificial, easily digestible food, prepared as follows: 150 parts of beef, 50 parts of calves' sweetbread, and sometimes also 25 parts of fat are chopped up very fine together and stirred into a pap with about 50 parts of warm water. It is administered, warmed up to about 104° F., through a stomach-tube, the stomach having been previously washed out. It may also be given by the mouth with the addition of bicarbonate of sodium and common salt. When dried and pulverized it has been recommended as a dusting powder (when liquid, by pencilling) to diphtheritic and croupous ulcers, as it exercises a marked solvent action on fibrin.

SULPHOICHTHYOLUM.

See Ichthyolum.

SULPHONALUM.

Hypnotic. Colorless, odorless, and tasteless crystals, volatilizable by heat, soluble in 500 parts of cold and 15 parts of boiling water, in 65 parts of cold and 2 parts of boiling alcohol.

Internally employed in doses of gr. xv.–xlv. (maximum dose 3 i., or 3 ij. a day) in powder, with as much warm drink as possible, it produces a quiet sleep lasting for five to eight hours. When given in fine powder, its action is quick (often within half an hour), but in a crystalline powder it sometimes requires several hours before inducing sleep. It may also be given in tablets. It is given for nervous insomnia following cerebral excitement, the nocturnal restlessness of fever patients, and long-continued excitement in sufferers from mental disease. In the last-named condition it is given in smaller doses (gr. viij. at a dose or gr. xlv. a day) repeated at intervals every few hours.

It is said to act well in repressing the night sweats of phthisis in doses of gr. iv.–viij. In cases of sleeplessness due to severe pain, hard cough, or dyspnœa the remedy seems to be ineffectual.

In isolated instances a transitory exanthem has been observed after the exhibition of sulphonal, occasionally vertigo, and in one instance aphasia of several hours' duration. It has been stated that long-continued use of the drug, especially in women, has caused general depression, intestinal colic, vomiting, and paralysis of the extremities, and one case of death is reported.

SULPHUR.

Sulphur Lotum.—*Internally* washed sulphur is given in doses of gr. viij.–xv. several times a day; as a strong purgative it is given in dose of ʒ ss.–i., best in powder, and usually with carminatives. It is a constituent of the compound licorice powder.

Externally employed in ointment (1 to 2 parts in 5 of fat) in the treatment of parasitic skin diseases, scabies, sycosis, etc.

Sulphur Præcipitatum.—Lac Sulphuris. *Internally* as a laxative in doses of gr. viij.–xv. several times a day in powders or pills.

Externally employed in lotions, and especially in cosmetic washes, in the strength of 3 to 5 parts in 100. It is also applied in ointment or paste (sulphur præcipitatum, ʒ iiss. with equal parts of glycerin and alcohol to make a soft paste) in acne (*conf.* Naphtholum), sycosis, and other diseases of the skin, especially of a parasitic nature.

Sulphur Sublimatum.—Flowers of sulphur. Used only externally, for the same object as the preceding, in ointment (1 to 3 parts to 10 of fat or black soap). It is also used for fumigation.

℞ Sulphur. loti,
Potass. tartrat., ... āā ʒ vi.
Jalapæ,
Pulv. carvi, ... āā ʒ iij.
M. et ft. pulvis. S. A teaspoonful at night. (Purgative.)

℞ Sulphur. præcip.,
Glycerini,
Spir. saponati, ... āā ʒ ij.
M. S. To be applied to the parts at night, and washed off in the morning with green soap. (For sycosis and acne.)

℞ Camphoræ, ... gr. viij.
Acaciæ, ... gr. xv.
Sulph. præcip. . . . . ʒ ij.
Liq. calcis,
Aq. rosæ, ... āā ℥ iss.
M. S. Kummerfeldt's lotion. (A wash for acne.)

℞ Sulph. præcip., ... ʒ i.
Vaselini flavi, ... ʒ vi.
Ol. olivæ, ... ʒ iij.
Ol. aurant. flor., ... gtt. v.
M. et ft. unguentum. S. Sulphur pomade. (For pityriasis capitis.)

℞ Sulph. præcip., ... ʒ ij.
Glycerini,
Alcohol. dil., ... āā ʒ ij.
Potass. carb., ... ʒ ij.
Ætheris, ... ʒ ij.
M. et ft. pasta. S. To be applied at night, and washed off in the morning with almond meal. (For obstinate comedones, acne.)

℞ Sulphur. præcip.,
Pulv. rhei,
Pulv. glycyrrh. comp.,
Elæosacch. fœniculi, ... āā ʒ ij.
M. et ft. pulvis. S. A teaspoonful morning and evening. (A laxative for use in hemorrhoids.)

℞ Sulph. sublimati, ... ʒ i.
Acid. carbolici, ... gr. xij.
Adipis colli equin., ... ʒ x.
Ol. bergamii, ... gtt. viij.
M. S. Lassar's hair-wash. (For falling of the hair.)

SUPPOSITORIA.

The basis of suppositories, when none is especially designated, is cacao-butter (oleum theobromæ), with which the remedy is mixed immediately or after being moistened in a suitable fluid. The form in general is that of a cone, and each suppository, unless otherwise specified, should weigh about fifteen grains. Vaginal suppositories are two or three times as heavy.

TALCUM PULVERATUM.

A finely powdered insoluble magnesium silicate.

Externally used as a dusting powder in intertrigo and for burns; mixed with salicylic acid (*q.v.*) for bromidrosis of the feet; as an ingredient of ointments and plasters; and finally as a powder for dusting sticky pills to prevent them from adhering together.

TAMARINDUS.

Tamarind pulp as used in medicine, having the consistence of a thick extract, contains vegetable acids, salts, gum, and sugar (pulp, 5 parts; sugar, 1 part).

A mild, pleasant, acid-tasting laxative employed in fevers and in cases of irritable intestines, and also as a refreshing drink in hot weather.

Internally given in quantity of ½ to 1 ounce in a quart of water as a cooling beverage; and in decoction (℥ ij.–vi. in ℥ iij. water), usually in combination with a saline, as a laxative.

℞ Tamarindi, ... ℥ i.
Mannæ, ... ℥ ss.
Coq. c.
Aq. fontan., ... ʒ v.
Magnes. sulph., ... ʒ ss.
M. S Half to one wine-glassful every morning.

℞ Infusi sennæ, ... ʒ v.
Tamarindi, ... ʒ i.
Sodii sulph., ... ʒ vi.
Syr. sennæ, ... ʒ ss.
M. S. A tablespoonful every half-hour.

TANNINUM.

See Acidum Tannicum.

TARAXACUM.

Internally employed (rarely) in decoction (℥ iiss.–iv. in ℥ iij.) in dose of a tablespoonful every hour in chronic diseases of the digestive organs, especially of the liver, and dropsy.

Extractum Taraxaci.—Given in doses of gr. x.–xxx. several times a day in pills.

Extractum Taraxaci Fluidum.—Used like the preceding in doses of ℥ ss.–ij.

TEREBINTHINA.

Contains from 15 to 30 parts of oil of turpentine combined with a resin which acts like an acid. It is never employed internally. When spread upon paper or leather it is used as a plaster by itself and as a constituent of other plasters mixed with equal parts of a resin, such as resina pini, colophony, wax, or suet.

Oleum Terebinthinæ.—Called also spirit of turpentine. It is soluble in alcohol, ether, and the fixed oils; and is not a stimulant, but a depressant, of the central nervous system, and of the respiratory and circulatory apparatus.

Internally employed in doses of 5 to 20 drops or more (of late in much larger doses up to one or two teaspoonfuls), pure with meat broth or lemon-juice taken after it, as a linctur with milk, or meal, in gelatin capsules, in pills, or in emulsion with acacia and with ether—

1. In gangrene of the lungs and putrid bronchitis, and also in simple (non-putrid) bronchorrhœa and in pulmonary hemorrhage, given by the mouth and as an inhalation (see below).

2. In renal calculi and gall stones and in biliary colic (see Æther.)

3. In acute phosphorus poisoning, the crude commercial oil of turpentine should be taken in about 100 times the quantity of the poison ingested, in divided doses of ♏ viij.–xv., pure or in emulsion, every half-hour; but milk and fats are to be avoided. It is also used in poisoning by hydrocyanic acid.

4. In diphtheria, in doses of 10 drops up to a teaspoonful three times a day, for adults correspondingly more, in warm

milk, mucilage, or sweetened water; or with spirit of ether 1 part to 15 of oil of turpentine (see below).

The alleged therapeutic effects of turpentine in neuralgia, catarrhal cystitis, gonorrhœa, and intestinal worms are unreliable, doubtful, and obtained better by other means.

Externally employed as a liniment, ointment (1 to 3 parts in 5 of fat), in plasters (1 part in 6 to 8 of resin), and as a rubefacient, either pure or mixed with equal parts of caustic ammonia —

a. As a counter-irritant in paralyses, anæsthesia, neuralgias, rheumatism, and pulmonary affections, especially in children; in meteorism and cholera, applied upon the abdomen; in chilblains and parasitic cutaneous disorders.

b. As an application in erysipelas.

c. As a useful irritant, mixed with equal parts of olive oil, in corneal opacities; it has been recommended for this purpose, but it should be used with great care.

It is also given by enema in obstinate constipation, in doses of ʒ i.–ij. in ℥ v. of fluid made into an emulsion with yolk of egg.

For inhalations in the respiratory affections above referred to, a spray may be used of oil of turpentine in water, or in solutions containing common salt, ammonium chloride, tannin, etc.; or a couple of tablespoonfuls of the turpentine may be poured into a pitcher of boiling water and the fumes inhaled as they arise in the vapor; or finally oil of turpentine may be sprinkled on the bedclothes.

In diphtheria it has been strongly recommended to burn from six to eight teaspoonfuls of turpentine in the room with doses and windows closed, keeping them closed for at least half an hour, and repeat this every three to five hours; or oil of turpentine may be sprayed about the sick-bed by means of an atomizer.

Unguentum Terebinthinæ.—Composed of equal parts of crude turpentine, yellow wax, and oil of turpentine. An irritant application used in chilblains.

Unguentum Terebinthinæ Compositum.—Composed of turpentine, ℥ ss.; the yolks of two eggs; myrrh and aloes, each gr. viij.; and olive oil, ʒ i. It is used chiefly as an application to blistered surfaces, to keep up the suppuration.

Unguentum Elemi.—Composed of elemi, larch turpentine,

suet, and lard, an old and long-esteemed dressing for small, open, suppurating surfaces.

Unguentum Basilicum.—Composed of olive oil 9 parts; yellow wax, colophony, mutton suet, each 3 parts; and turpentine, 2 parts. It is used alone or with other substances (*e.g.*, 7.5 parts to 5 of euphorbium) as an irritant salve for maintaining issues.

The basilicon ointment of the U. S. Ph. (Ceratum Resinæ) is composed of resin, 35 parts; yellow wax, 15 parts; and lard, 50 parts, and corresponds to

Unguentum Flavum.—Composed of pine resin, wax, and lard, colored with turmeric.

These ointments are used especially in cases in which a greater or less irritant effect is desired, as to mature an abscess or stimulate sluggish granulations.

Terebinthina Cocta.—Is occasionally give in doses of gr. v.–xv. several times a day; and is used externally as a styptic powder when combined with equal parts of alum or acacia; and also as a constituent of various plasters.

Terebinthina Laricina.—Venice turpentine is thinner and clearer than the officinal turpentine.

Internally employed in doses of ♏ v.–xv. several times a day in pills, confection, or emulsion for the same purposes as oil of turpentine. In diphtheria ʒ ij. for a child from two to seven years old, and ʒ iiss.–iv. for older children, may be given at a dose followed by a glass of milk.

Externally employed in injections in emulsion with mucilage (♏ viij.–ʒ i. to ℥ iij.); and also like turpentine for plasters, ointments, and, with yolk of egg, for liniments.

Terpinum Hydratum.—Terpin hydrate is obtained by the action of nitric acid upon oil of turpentine in the presence of alcohol.

Internally employed in doses of gr. iss.–vi. several times a day (up to gr. xv.–xxx. a day), cautiously increased, in pills, powders, capsules, or solution in water and alcohol, as a diuretic in chronic nephritis and cardiac muscular insufficiency, accompanied by albuminuria and œdema, usually with excellent effect. As an expectorant it is said to loosen the bronchial phlegm and render it more easily coughed up when given in small doses (gr. iss.), but to render the secretion less abundant in larger doses (up to gr. xv.). It also acts well in the relief of neuralgia.

Terpinolum.—Terpinol is a mixture of various terpenes, which is given to meet the same indications as the preceding, but may be exhibited in somewhat larger doses (gr. viij.–xv. in capsules).

℞ Ol. terebinth., ... ʒ ij.
Ætheris, ... ʒ iij.
M. S. Fifteen to 30 drops several times a day in renal colic and gall stones. (Durande's remedy.)

℞ Ol. terebinth., ... ʒ iiss.
Mucilag. acaciæ, ... ℥ x.
Syr. aurant. cort., ... ℥ ij.
M. S. To be taken in three portions. (Phosphorus poisoning.)

℞ Ol. terebinth.,
Mucil. acaciæ,
Syr. simplicis, ... āā ʒ ij.
M. S. To be taken in three doses at half-hour intervals. (Diphtheria.)

℞ Ol. terebinth., ... ʒ v.
Acidi carbol., ... gr. xij.
Camphoræ, ... gr. viij.
M. S. For painting over the affected portion in diphtheria.

℞ Terpin. hydrat., ... ʒ ss.
Alcohol.,
Aq. destillatæ,
Syr. menthæ, ... ℥ iss.
M. S. A tablespoonful from three to six times a day. (Expectorant, and in chronic nephritis.)

℞ Ol. terebinth.,
Spt. ætheris nitrosi, ... āā ʒ iiss.
Ætheris, ... ♏ xxiv.
M. S. Twenty to 50 drops in oatmeal water; and in addition lemon juice in the same vehicle as a drink. (Phosphorus poisoning.)

℞ Ol. terebinth.,
Spt. ætheris nitrosi, ... āā ʒ iiss.
Bals. copaibæ, ... ʒ v.
(Acid. benzoic., ... ʒ ss.)
M. S. Thirty drops three times a day. (Gonorrhœa, vesical catarrh.)

℞ Terebinth.,
Petrolei,
Ceræ flavæ, ... āā 3 iiss.
M. et ft. unguentum. (Salve for frost-bites.)

℞ Terpin. hydrat.,
Sodii benzoatis, ... āā gr. xv.
Sacch. albi,
Mucil. acaciæ, ... āā q.s.
M. et ft. pil. No. 10. S. One pill every hour or two. (In chronic nephritis, and as an expectorant.)

THALLINÆ SULPHAS.

The tartrate and the tannate are also made. An antipyretic. Thalline is a synthetically prepared quinine-base, occurring in the form of a yellowish-white powder. The sulphate and tartrate contain 76.9% of thalline, the tannate only 33.6%, the latter is therefore to be given in double the dose of the former. The sulphate is, however, employed almost exclusively. The drug is well borne by the kidneys and intestine; after it has been used for a considerable time, the urine takes on an olive-green or greenish-black stain, but never becomes albuminous. Thalline must not be given in diseases of the heart and kidneys.

Internally employed in doses of gr. iij.–viij. for adults, gr. $\frac{1}{6}$ for each year of life for children, in order to lower the temperature once; for a repeated antipyretic effect, it may be given in doses of gr. iss.–v. up to the maximum of gr. viij. (gr. xxiv. pro die) in powders, pills, water or wine, increased or decreased according to the thermometric indications. Doses of gr. iv.–viij. will lower the temperature (with the production of diaphoresis) about two degrees Fahrenheit in one-half to one hour; but it will rise again in three or four hours, usually with a chill. Very large doses excite vomiting, chills, collapse, and sometimes hyperæmia of the kidneys with œdema.

The remedy is employed chiefly in typhoid fever, in which it is almost a specific, but also in other feverish and inflammatory diseases such as erysipelas and pyæmia. It is given mainly to lower very elevated temperatures promptly and decidedly, but also, in small and repeated doses, to keep a con-

tinued fever under control and prevent too high a temperature. For this purpose doses of gr. i., gradually increased by gr. $\frac{1}{6}$ at a time, are given at frequent intervals (thallinization).

In general it may be said that the therapeutic value of thalline is less than that of antipyrine or antifebrin, but greater than that of kairin.

Externally employed in one and one-half to two per cent aqueous solution for urethral injections two or three times a day in acute gonorrhœa; in the chronic form, pencils are used consisting of sulphate of thalline gr. viij. in ʒ iiss. of cacao butter. In addition, the remedy is given internally in doses of gr. iv. every three hours.

THEINA.

See Caffeina.

THEOBROMINÆ NITRO-SALICYLAS.

Also called diuretin. It is a white powder, soluble in water, which acts directly upon the renal parenchyma, producing diuresis.

Internally employed in doses of gr. iss. from four to six times a day, in powder, as a diuretic.

THIOLUM.

German ichthyol. It occurs in the form of a liquid or in the dry state, and is obtained from brown coal-tar oil. It is said to be similar to ichthyol in indications, dosage, and action. Thiolum siccum is mixed with talc in the proportion of 10 to 20 parts in 100, and used as a dusting powder.

THYMOLUM.

Thymic acid. Crystals obtained from oil of thyme and having its odor, soluble in less than 1 part of alcohol, ether, and chloroform, but only in 1,100 parts of water. It hinders the development of schizomycetes more than does carbolic acid, does not act as a local irritant, and is in general much less poisonous than this. The odor, which is at first pleasant, becomes after a while disagreeable to most persons.

Internally employed (rarely) in powder or emulsion, less often in alcoholic, alkaline, or watery solution. In large doses it causes pain in the stomach and vomiting.

1. In doses of gr. i.–iss. several times a day in abnormal fermentative processes in the stomach (with dilatation).

2. In doses of gr. xv.–xxx. as an antipyretic, and in articular rheumatism, but it is here less certain than salicylic acid.

3. As an anthelmintic, especially recommended for the destruction of Anchylostomum duodenale and tape-worm. For the first it is given in amount of ʒ ss.–i. divided into from four to six doses; for the second four teaspoonfuls of castor oil are taken in the evening, and the following morning ʒ ij. of thymol, in capsules, in twelve doses fifteen minutes apart, and twenty minutes after the last dose four teaspoonfuls more of castor oil. (Such large does are risky, even when, as is recommended, their administration is combined with stimulants, such as rum or brandy, in order to prevent a lowering of pulse, temperature, and respiration.)

Externally used, like carbolic acid, in watery solution of 1:1,100 as an antiseptic and deodorizing application to ichorous ulcers; painted on the parts in prurigo, eczema, etc.; in mouth-washes; and as an injection into the bladder (gr. xiij.: Oij.). The odor attracts flies.

℞ Thymol., ... gr. xv.
Spt. menth. pip., ... ʒ v.
M. S. Twenty to 30 drops several times a day.

℞ Thymol., ... gr. xv.–xxiv.
Ol. olivæ, ... ℥ iij.
(or Glycerini, ... ʒ iiss.
Aq. destillat., ... ℥ iij.)
M. S. Lotion for prurigo, and on compresses in eczema and erysipelas.

℞ Thymoli, ... gr. iv.
Acid. benzoici, ... gr. xlv.
Tr. eucalypti, ... ʒ iij.
Aq. destillat., ... Oiss.
M. S. Antiseptic mouth-wash.

℞ Thymoli, ... gr. xv.
Alcohol., ... ʒ iiss.
Glycerini, ... ʒ v.
Aq. destillat., ... Oi.

M. S. Thymol-glycerin. Applied in full strength in prurigo and pityriasis; or kept as a standard thymol solution for use in any desired dilution, on dressings, for mouth-washes, or for spray inhalations.

℞ Thymoli, ... gr. iij.
Acidi salicyl., ... gr. xv.
Solve in alcohol, ... q.s.
Bals. peruvian., ... ♏ iv.
Vaselini, ... ʒ i.

M. et ft. unguentum. S. For an application to ulcers and bed-sores.

℞ Thymoli, ... gr. iij.
Solve in alcohol . . . . . q.s.
Aq. bull., ... ʒ vi.
(Morph. hydrochlor, ... gr. i.)

S. For inhalation.

TINCTURA AMARA.

See Gentiana.

TINCTURA AROMATICA.

See Cinnamomum.

TINCTURA AROMATICA ACIDA.

See Acidum Sulphuricum.

TINCTURA GALLÆ.

See Acidum Tannicum.

TINCTURA KLAPROTHI.

See Ferri Acetas.

TINCTURA TONICO-NERVINA BESTUSHEFII.

See Ferri Chloridi Liquor.

TRAGACANTHA.

See Mucilaginosa.

TRAUMATICINUM.

A solution of gutta-percha in a sufficient quantity of chloroform to make a thin, syrupy fluid. When painted over the parts, like collodion, it forms a smooth transparent film, which is, however, not as enduring as collodion, and must be more frequently renewed.

Externally used in scaly affections of the skin, erosions, burns, and frost-bites; in ingrowing toe-nail, after a prolonged foot-bath, etc.

TRIBROMPHENOLUM.

Is recommended as an antiseptic, like carbolic acid, but has not yet been sufficiently tried to determine its value.

TRIFOLIUM FIBRINUM.

A febrifuge and bitter.

Internally employed as a bitter in decoction of gr. xv.–ʒ i. in ℥ v.; as a febrifuge in decoction of ʒ i.–iiss. in ℥ v. A tea is used as a domestic remedy.

Extractum Trifolii Fibrini.—*Internally* employed in doses of gr. viij.–xv. several times a day in pill or extemporaneous mixture as a febrifuge.

TRIMETHYLAMINUM.

See Propylaminum.

TRIPOLITHUM.

A gray powder formed of calcium and silicon, with a little magnetic oxide of iron, which resembles plaster of Paris, and is employed like it for splints. It is less hygroscopic, lighter, and cheaper than gypsum, and sets more rapidly.

TROCHISCI, PASTILLI.

Troches and lozenges are very convenient forms for the administration of various medicinal substances. They are made of chocolate, tragacanth, starch, or acacia, with sugar (sometimes with the addition of spices or one of the volatile oils), and usually weigh about 15 grains each. The non-

officinal troches can be specially prescribed, but their preparation requires a little time. There are sixteen officinal troches in the U. S. Pharmacopœia.

The solid constituents of many natural mineral waters (Ems, Vichy, Soden, etc.) are made into pastilles, and frequently used.

℞ Quininæ hydrochlor., ... ʒ i.
Sacch. albi, ... ʒ v.
Misce et adde
Massæ cacao, ... ℥ i.
M. et ft. trochisci No. 30.

℞ Ferri lactatis,
Tragacanthæ, ... āā ʒ iss.
Sacch. albi, ... ℥ iij.
Aquæ, ... q. s.
M. et ft. trochisci No. 50.

TUBERCULINUM KOCHII.

An extract made by means of fifty-per-cent glycerin from pure cultures of the tubercle bacillus. Koch thus describes its action. The tubercle bacilli, during their growth in the tissues, produce certain substances which cause a necrosis of the cells in their neighborhood, and in such tissues the bacilli can grow no further, and, under certain circumstances, perish. If now the quantity of this necrosing product were increased in the neighborhood of the bacilli, the necrosis would involve a greater area, the involved tissues would become disintegrated and removed, and in their removal would carry with them the already weakened bacilli.

The dose of tuberculin varies from one-half a milligram up to one gram (♏ $\frac{1}{12}$ to xv.)! The remedy is given subcutaneously in increasing doses, at intervals of two or three days, and the stronger injection is given only when a "reaction" no longer follows the weaker one. The reaction is manifested usually by high fever, frequently ushered in by a chill, local pain and swelling, and general malaise.

On account of the danger and insuccess of the remedy in advanced stages of phthisis, it is to be given only in the first stage of tuberculosis. The patient is always to be kept under careful observation.

TUPELO.

The spongy roots of Nyssa uniflora, cotton-gum, are employed, like laminaria and sponge-tents, for dilating the cervical canal.

UNGUENTUM ACRE.

See Hydrargyri Chloridum Corrosivum.

UNGUENTUM AD FONTICULOS.

Composed of euphorbium, 1 part; cantharides, 6 parts; yellow wax, 6 parts; and olive oil, 10 parts.

UNGUENTUM AQUÆ ROSÆ.

Cold-cream. See Unguentum Leniens.

UNGUENTUM AUTENRIETHI.

See Antimonii et Potassii Tartras.

UNGUENTUM BASILICUM.

See Terebinthina.

UNGUENTUM AD DECUBITUM.

See Plumbi Tannas.

UNGUENTUM DIACHYLON.

See Plumbi Oxidum.

UNGUENTUM ELEMI.

See Terebinthina.

UNGUENTUM FLAVUM.

See Terebinthina.

UNGUENTUM FUSCUM.

Unguentum Matris or Universale. Equal parts of red oxide of lead and olive-oil are boiled until a blackish-brown color is produced; when it is nearly cool, two parts of camphor rubbed up with oil are added to 96 parts of the same. It is a popular drawing, healing, and resolvent salve.

UNGUENTUM HYDRARGYRI.

Blue ointment. See Hydrargyrum.

UNGUENTUM HYDRARGYRI AMMONIATI.

White precipitate ointment. See Hydrargyrum Ammoniatum.

UNGUENTUM LENIENS.

German-cold cream. Composed of white wax, 4 parts; spermaceti, 5 parts; almond oil, 32 parts; water, 16 parts; and, for every 50 parts, 1 drop of oil of roses. (The cold-cream of the U. S. Ph.—Unguentum aquæ rosæ—consists of white wax and spermaceti, each 10 parts; rose water, 30 parts; and expressed oil of almond, 50 parts.) A very good soothing application to the skin, especially for chapped hands.

UNGUENTUM OPHTHALMICUM.

See Hydrargyri Oxidum Rubrum.

UNGUENTUM POPULI.

Composed of poplar buds 1 part, and lard two parts, gently boiled together. A cooling ointment.

UNGUENTUM ROSATUM.

Composed of rose water, 5 parts; white wax, 10 parts; and lard, 50 parts. An ointment employed in dressings, and as a vehicle for medicinal substances, especially for ophthalmic use.

URETHANUM.

A substance, occurring in the form of powder, nearly related to urea, readily soluble in water. It is a hypnotic, acting upon the cerebrum.

Internally employed in doses of gr. xv. in aqueous solution, for adults, repeated every hour until sleep is produced, or given in a single dose of ʒ ss.–i. (Some think that the remedy acts more certainly when given in the smaller hourly doses; others maintain the opposite.) When the sleeplessness is the

result of mild cerebral excitement, the remedy is said to act as a certain and rapid sedative and hypnotic, but to be less efficacious in excitable states of mental disease (mania and delirium). It does not affect the respiratory organs or the heart, and is, therefore, recommended as a safe hypnotic in patients with cardiac or pulmonary disease, and also in children. For children under two years of age, the dose is upward of gr. iv.; for those between two and three years, gr. viij., and proportionately larger doses for older children. Its unpleasant incidental effects are vomiting, sweating, vertigo, and a feeling of heat. In general, it may be said that the action of the remedy is uncertain.

It has also been recommended for subcutaneous use (thirty-per-cent solution) in convulsions, especially those caused by strychnine.

℞ Urethani, ... 3 i.
Aq. destill., ... 3 x.
Syr. aurant. cort., ... 3 vi.
M. S. For adults, one tablespoonful every hour until the desired result is obtained.

℞ Urethani, ... 3 ss.
Aq. aurant. flor.,
Syr. simplicis., ... āā 3 v.
M. S. For children, one or two teaspoonfuls at night.

USTILAGO.

Corn-smut. A fungus growing on Indian corn. From it is made the following:

Extractum Ustilaginis Fluidum. — *Internally* recommended in doses of 30 to 40 drops, repeated two or three times, as a substitute for ergot in inefficient pains and uterine hemorrhage, when the os is well dilated. It has not yet been sufficiently tried to determine its value.

UVA URSI.

Bearberry. An astringent tonic and diuretic. Its principal ingredients are tannin and arbutin, a crystallizable glucoside.

Internally employed in doses of gr. xv.–xlv. in decoction

for diseases of the urinary tract, catarrhal, hemorrhagic, and purulent cystitis, nephritis, and dropsy. It colors the urine a greenish-black. The decoction is made of the strength of ʒ iiss.–iv. in ℥ iij., and is to be shaken up with animal charcoal, and then filtered in order to remove the tannin, which might affect injuriously the digestion. The decoction is also used for injection into the bladder.

Arbutinum.—Occurs in the form of needles of a silky lustre, soluble in boiling water.

Internally employed in five-per-cent solution in doses of gr. xv.–xxiv., or better in powder in daily doses of gr. xlv.–lxxv., for the same purposes as uva ursi.

℞ Decocti uvæ ursi (ʒ iiss.), . . . ℥ v.
Potassii iodidi, ... gr. xlv.–lxxv.
Syr. simplicis, ... ℥ ss.
M. S. One glassful three times a day. (Contracted granular kidney.)

℞ Pulv. uvæ ursi,
Pulv. lycopodii, ... āā ʒ v.
Mel. despumati, ... q.s.
M. et ft. electuarium. S. A teaspoonful from four times a day to every two hours. (Subacute catarrhal cystitis.)

VALERIANA.

Antispasmodic, antihysterical, and stimulant.

Internally employed in doses of gr. viij.–xxx. several times a day in powder, confection, infusion, or maceration (ʒ iiss.–iv. to ℥ vi.) as an antispasmodic remedy:

1. In hysteria, with all its symptoms; but less effective in sensory disturbances and hemicrania.

2. In epilepsy, it is frequently of service in doses of gr. viij. in powder three times a day, gradually increased to ʒ vi. a day; less useful in other neuroses.

Externally, it is given as an antispasmodic and stimulant in enemata and snuffs.

Tinctura Valerianæ.—(One part to 5 parts of diluted alcohol.) Given in doses of ʒ ss.–ij. for the same purposes, as the crude drug.

Tinctura Valerianæ Ammoniata.—(One part to 5 parts of aromatic spirit of ammonia.) Dose: ʒ ss.–i.

Extractum Valerianæ Fluidum.—Dose: 30 to 60 minims.

℞ Infusi valerianæ (℥ v.), ... ℨ v.
Spt. ætheris, ... ℥ i.
Syr. cinnamomi, ... ℥ i.
M. S. A tablespoonful every hour or two. (Nervine stimulant.)

℞ Tinct. valerianæ, ... ℥ vi.
Camphoræ, ... gr. xv.
M. S. Thirty to 40 drops several times a day in chamomile tea.

℞ Pulv. valerianæ,
Ext. valerianæ, ... āā ℥ iss.
M. et ft. pil. No. 100. S. Five to ten pills three times a day.

℞ Rad. valerianæ,
Fol. menthæ pip.,
Fol. trifolii fibrini, ... āā ℨ i.
(Fruct. aurant. immatur., . . . ℥ iiss.)
M. et ft. species. S. A tablespoonful in two cupfuls of water. (Tea for hysterical and nervous troubles.)

℞ Tinc. valerianæ, ... ℨ ss.
Tinct. ferri chloridi, ... ℥ i.
M. S. Twenty drops in water three times a day. (Hysteria, cardialgia.)

VANILLA.

A very agreeable aromatic and restorative, employed in doses of gr. i.–viij. several times a day in powder, pills, or infusion (℥ ss.–ij. in ℨ iv.).

Tinctura Vanillæ.—Ten-per-cent strength. Given in doses of 30 to 60 drops.

Vanillinum.—Given in doses of gr. $\frac{1}{6}$ to $\frac{1}{3}$ several times a day in powders and pills, and in mixture of the strength of gr. viij.–ℨ iij. A favorite deodorizing remedy.

VASELINUM.

Petrolatum. See Petroleum.

VERATRUM ALBUM.

White hellebore. Now seldom used in medicine.

Veratrina.—A loose white powder, or white amorphous mass, the dust of which causes sneezing; soluble in 4 parts of

water and 2 parts of alcohol. It acts upon the heart muscle, and in a complicated way upon the various cardiac and vascular centres, producing retardation of the pulse and lowering of the blood pressure, with fall of the temperature.

Untoward Incidental Effects.—Vomiting, painful diarrhœa; strong irritation of the buccal and nasal mucous membrane. A dangerous effect of the drug is collapse, to prevent which opium, tannin, and solution of anisated ammonia are recommended.

Internally employed (rarely and with caution) in doses of gr. $\frac{1}{40}$ to $\frac{1}{20}$ (maximum gr. $\frac{1}{12}$, or gr. $\frac{1}{3}$ per day), in pills or lozenges, as an antipyretic in acute inflammatory affections, erysipelas, etc.; in various neuroses, spasmodic affections, and neuralgia; in acute rheumatism and gouty paralyses.

Externally applied (rarely) in ointment (one per cent in vaselin) as a derivative and analgesic remedy in neuralgia, hemicrania, sciatica, and painful rheumatic affections.

℞ Veratrinæ, ... gr. $\frac{1}{3}$
Pulv. glycyrrh.,
Ext. glycyrrh., ... āā q.s.
M. et ft. pil. No. 40. S. Four pills a day. (Tremor.)

℞ Veratrinæ, ... gr. iv.
Chloroformi, ... ʒ i.
Ol. olivæ,
(or Ung. paraffin.), ... ʒ vi.
M. et ft. unguentum. S. For external use, by rubbing on the parts several times a day. (Rheumatism, neuralgia, toothache, etc.)

℞ Veratrinæ, ... gr. iij.
Ext. opii, ... gr. viij.
Adipis, ... ʒ v.
M. et ft. unguentum. S. For external use.

℞ Veratrinæ, ... gr. iij.
Solve in
Alcohol, ... q.s.
Adipis, ... ʒ iiss.
M et ft. unguentum. S. A piece the size of a bean to be rubbed on the skin in sciatia.

VINUM AROMATICUM.

Composed of 1 part each of lavender, origanum, peppermint, rosemary, sage, and wormwood macerated in enough sherry wine to make 100 parts.

XYLOLUM RECTIFICATUM.

A colorless fluid, with an aromatic odor, obtained by distillation from coal-tar oils.

Internally given to children in doses of 3 to 5 drops in Malaga wine, to adults in doses of 10 to 20 drops (♏ xxx.–xlv. a day) in a mucilaginous vehicle, or better in capsules. When given early it is said to prevent confluence of the vesicles in small-pox, by causing a rapid coagulation of their contents, and also to hasten the drying of the pustules and to prevent pitting.

℞ Xyloli, ... ♏ viij.–xv.
Aq. fœniculi, ... ℥ i.
Vini malacensis, ... ℥ ij.
Syr. aurant. cort., ... ℥ i.

M. S. A dessertspoonful every two hours, for children. (Small-pox.)

℞ Xyloli, ... ♏ xlv.
Aq. menth. pip.,
Aq. destillatæ, ... āā ℥ iss.
Syr. cinnamomi,
Mucil. acaciæ, ... āā ℥ ss.

M. S. A tablespoonful every two hours, for adults. (Small-pox.)

ZINCI ACETAS.

White, shining scales, soluble in 3 parts of cold and 2 parts of hot water, and in 36 parts of alcohol. It is employed like the sulphate of zinc, than which it is somewhat milder, as an astringent, in solutions of 1 to 3 parts in a thousand as a collyrium, and of 2½ to 5 parts per thousand as an injection in gonorrhœa.

ZINCI CHLORIDUM.

Occurring in the form of a white deliquescent powder, or of small sticks, readily soluble in water and alcohol. Disinfectant and escharotic. (See also Rotterinum.)

Externally employed in aqueous solution, usually with the addition of a few drops of hydrochloric acid, as a lotion and dressing for clean wounds in one-half to one per cent strength, and for septic wounds and ulcers in the strength of two to ten per cent; for a collyrium in the strength of 2:10,000; for urethral injections in gonorrhœa, 5 to 10 parts in 10,000. In gonorrhœal vaginitis and endometritis, vaginal douches of a one-per-cent solution, warmed to 86° F., twice a day, the woman lying in the supine position, are strongly recommended; as is also the use of tampons wet with the same solution. For cauterizing cancerous, lupous, and other forms of ulcers a two to three per cent solution is employed, or Canquoin's paste. This is made with chloride of zinc and flour, or, better, powdered althæa, and a little glycerin, in four strengths, 1 part of zinc to 1, 2, or 3 parts of excipient, or 1 part of oxide of zinc to 4 parts each of chloride of zinc and starch. It is applied in a layer three or four lines thick, and allowed to remain for several days, and cauterizes, according to the strength of the paste, to a depth as great as, or greater than, the thickness of the layer. For mild cauterizations, pencils, composed of 1 part of chloride of zinc to from 1 to 5 of nitrate of potassium, are used.

ZINCI FERROCYANIDUM.

Internally employed in doses of gr. i.–iss.–ij. several times a day (maximum dose, gr. iv. a day) in powder or pill, as an alterative and antispasmodic, like oxide of zinc, in chronic nervous affections, gastrodynia, etc.

℞ Zinci ferrocyan., ... gr. v.
Magnesiæ, ... gr. xl.
Pulv. cinnamomi, ... ʒ i.

M. et div. in chart. No. 10. S. One powder every four hours. (For nervous affections of the stomach.)

ZINCI LACTAS.

A mild and the most readily tolerated of all the zinc preparations.

Internally employed in doses of gr. ss.–i. (maximum dose, gr. v. a day) like oxide of zinc, which is itself partly changed into the lactate in the stomach.

ZINCI OXIDUM.

A soft, amorphous powder, insoluble in water.

Internally employed in doses of gr. i.–viij. several times a day in powder, pills, troches, or suspension, in chronic neuroses, especially epilepsy and chorea, in which it is given in gradually increasing doses up to gr. xv. a day (it may possibly cause vomiting) for upward of three months. The drug is said to give especially brilliant results in infantile eclampsia and whooping-cough, in doses of gr. ⅓ to iij.; also in neuralgias, and in diarrhœa and vomiting of children, in doses of gr. i. every three hours; and finally in chronic diarrhœa.

Externally applied: *a.* To secreting cutaneous surfaces, intertrigo, sore nipples, etc., in the form of dusting powders with lycopodium, starch, or sugar, or in ointment (ten to fifty per cent); also, mixed with starch, in acute eczema.

b. In conjunctivitis, in the form of eye powders (1:5 of sugar), eye salve (five to twenty per cent), or eye water (gr. ij.–xv. in ʒ vi. of water).

c. For insufflation into the larynx, pure or mixed with equal parts of alum or tannin.

Unguentum Zinci Oxidi.—Composed of oxide of zinc 20 parts, and benzoinated lard 80 parts. Used as an application to moist secreting surfaces.

℞ Zinci oxidi, ... gr. xv.
Pulv. belladon., ... gr. iss.
Pulv. valerian., ... ʒ i.

M. et div. in chart. No. 10. S. One powder two or three times a day. (Epilepsy, eclampsia.)

℞ Zinci oxidi,
Ext. hyoscyami,
Ext. valerianæ, ... āā ʒ ss.
Pulv. althææ, ... q.s.

M. et ft. pil. No. 40. S. One pill two or three times a day. Meglin's Pills. For epilepsy, chorea, neuralgia, and headache.

℞ Zinci oxidi, ... gr. xlv.
Pulv. glycyrrh.,
Extr. glycyrrh., ... āā q.s.

M. et ft. pil. No. 40. S. One pill, gradually increased to five or ten, three times a day. (Epilepsy.)

℞ Zinci oxidi, ... gr. xv.–xxx.
Sodii bicarb., ... gr. viij.
M. et div. in chart. No. 4. S. One powder every three hours as required. (Chronic diarrhœa.)

℞ Zinci oxidi, ... ʒ ij.
(Magnesii carb., ... ʒ i.)
Amyli, ... ʒ iv.
M. et ft. pulvis. S. Dusting powder for moist exanthemata or intertrigo.

℞ Zinci oxidi, ... ʒ ss.
Acidi tannici, ... gr. xv.
Glycerini, ... ʒ iss.
Bals. peruvian., ... ʒ ij.
Camphoræ, ... ʒ i.
M. et ft. linimentum. S. For external use in frost-bites.

ZINCI SULPHAS.

Astringent and emetic.

Internally employed as an emetic in doses of gr. iij.–viij. (maximum dose, gr. xv.) in several portions given every five minutes, in powder, pill, or solution, especially in croup and narcotic poisoning.

Externally used in one-half to one per cent solution for urethral and vaginal injections in gonorrhœa; in conjunctivitis as a lotion in one-quarter to one-half per cent solution, as eye drops (1:500), and in one-half to one per cent ointment; as an injection in otorrhœa in one-quarter to one-half per cent solution. It may also be applied pure or mixed with starch as a snuff in profuse epistaxis.

℞ Zinci sulphatis, ... gr. iv.
Aluminis, ... gr. v.–xv.
Aq. font., ... ℥ iv.
M. S. For injection in gonorrhœa.

℞ Zinci sulphatis, ... gr. xv.–xxx.
Tr. opii, ... ʒ ss.
Aq. destillatæ, ... ℥ vi.
M. For injection twice a day in gleet.

℞ Zinci sulphatis, ... gr. viij.
Petrolati, ... ʒ iiss.
M. S. For eczema of the ear.

℞ Zinci sulphatis,
Aluminis, ... āā gr. xxiv.
Aq. destillatæ, ... ℥ iij.
M. S. For application in dressings to bleeding surfaces.

ZINCI SULPHOCARBOLAS.

Colorless and nearly odorless crystals, soluble in water.

Externally employed in one to two per cent solution in disinfectant dressings, in one-quarter to one-half per cent solution in urethral and vaginal gonorrhœa. It combines the disinfectant properties of carbolic acid with the astringent action of sulphate of zinc.

℞ Zinci sulphocarbolatis, ... gr. xv.
Collodii, ... ℥ iss.
Ol. limonis, ... ♏ xv.
Alcohol., ... ʒ i.
M. S. For external use in prickly heat, chloasma hepaticum, and other pigmentations of the skin.

℞ Zinci sulphocarbol., ... ʒ ss.
Glycerini,
Aq. rosæ, ... āā ʒ vi.
Spt. lavandulæ, ... ʒ i.
M. S. Apply to pigmentations of the skin and freckles twice a day, washing off with water at the end of one-quarter to one hour.

ZINCI SULPHO-ICHTHYOLAS.

See Ichthyolum.

ZINCI VALERIANAS.

Is said to combine the therapeutic actions of oxide of zinc and valerian.

Internally employed in doses of gr. ½ to i. several times a day (maximum dose, gr. v. a day), but single doses of gr. iij. are used) in powder or pill for hysteria, neuralgia, epilepsy, and spasmodic affections, but especially for hemicrania. It is

also recommended in doses of gr. v. every six hours for diabetes insipidus.

℞ Zinci valerianatis,
Pulv. valerianæ, ... āā gr. lxxv.
Tragacanthæ, ... q.s.
M. et ft. pil. No. 100. S. One or two pills three times a day.

℞ Zinci valerian., ... gr. xv.
Extr. belladonnæ, ... gr. iss.
Pulv. glycyrrh.,
Extr. glycyrrh., ... āā q.s.
M. et ft. pil. No. 20. S. One pill two or three times a day. (Hysteria.

III.

REMEDIES MOST COMMONLY USED FOR SUBCUTANEOUS INJECTION.

For drugs not included in this list, and also for more specific directions as to the indications and method of making the injections, the reader is referred to Part II. When no other vehicle is specified distilled water is to be employed.

Acidum benzoicum 1:10 in alcohol. (The solution and syringe should be slightly warmed.) Dose: ♏viij.–xv.

Acidum carbolicum, 2:100. Dose: ♏xv.–xxx.

Acidum hyperosmicum, 1:100.

Æther, undiluted. Dose: ♏xv.–cl.

Antipyrine 5:10. Dose: ♏xv.–xxx.

Apomorphinæ hydrochloras, 2:1,000. Dose: ♏xv.–xxx. as an emetic for children.—1:100. Dose: ♏xv.–xxx. for adults.

Atropinæ sulphas, 1:1,000. Dose: ♏xv.

Caffeinæ sodio-benzoas, 2:10.

Caffeinæ sodio-salicylas, 1 or 2:10. Dose: ♏xv.–xxx.

Camphora, 1:9 in ether or olive oil. Dose: ♏xv.–lxxv.

Chloral, equal parts with distilled water.

Cocainæ hydrochloras, from 1 to 5:100.

Codeinæ phosphas, from 2 to 5:100.

Colchicina, 2:1,000.

Curare, 5 to 10:100 (a little acid should be added). The strength of the preparation must be previously ascertained, as it is liable to vary.

Emetina, 1:200 with a few drops of sulphuric acid. Dose ♏iv.–viij., repeated until vomiting is produced.

Ergotæ extractum fluidum, 10 to 15:100. Dose: ♏xv.–xlv.

Ferri citras, 1:10.

Hydrargyri chloridum corrosivum, 1:100 with 10 parts of sodium chloride. Dose: ♏xv. every second day.

Hydrargyri chloridum mite, 1:9 in liquid vaselin. Dose: ♏xv. every six to eight days.

Hydrargyri formamidati liquor, 1:100. Dose: ♏xv.

Hydrargyri oxidum flavum, 1 or 2:100 in liquid vaselin. Dose: ♏xv. every second or third day.

Hydrastinæ hydrochloras, 1:10.

Hyoscinæ hydrochloras, 1:5,000. Dose: ♏viij.–xv. (gr. $\frac{1}{600}$–$\frac{1}{300}$).

Methylal, 1:9.

Morphinæ hydrochloras, 1 or 2:100 in distilled water or equal parts of distilled water and water of bitter almond. Dose: ♏viij.–xxx.

Pilocarpinæ hydrochloras, 1:100. Dose: ♏xv.–xxx.

Potassii arsenitis liquor, 5:10. Dose: 3 or 4 drops once or twice a day.

Quininæ hydrochloras, 1:10 in equal parts of water and glycerin. Should be injected warm.

Quininæ hydrochloras carbamidatus, 2:10.

Strychninæ nitras, 1:200. Dose: ♏viij.–xv.

IV.

THE MOST COMMONLY EMPLOYED REMEDIES FOR INHALATION.

THE following is a list of the remedies most commonly employed for inhalation, together with their dosage, the middle column showing the average dose. Where nothing is said concerning the vehicle it is to be understood to be one pint of distilled water. It must be remembered in using sprays by inhalation that the remedy is applied in finely divided form over a broad extent of surface, and is therefore placed under the most favorable conditions for absorption. Care must accordingly be taken in regard to the stronger substances, and it is almost always better to give them well diluted than in concentrated solutions.

	Dose of the Remedy.			
Acidum benzoicum	ʒ v.	ʒ ix.	ʒ xij.	In 8 oz. each of alcohol and distilled water.
Acidum carbolicum	gr. viij.	gr. xv.	ʒ i.	
Acidum lacticum	℥ ss.	℥ i.	℥ iss.	
Acidum salicylicum	gr. viij.	gr. xv.	ʒ i.	
Acidum tannicum	gr. xv.	ʒ ss.	ʒ iiss.	
Æther	—	—	—	ʒ ss.–℥ i. undiluted.
Æthyl bromidum	—	—	—	ʒ ss.–℥ i. undiluted.
Alumen	gr. xv.	ʒ ss.	ʒ iiss.	
Ammonii chloridum	gr. xv.	ʒ ss.	ʒ iis.	
Amyl nitris	—	—	—	2–5 drops undiluted.
Aqua amygdalæ amaræ	ʒ ss.	ʒ i.	ʒ iv.	
Aqua creasoti	ʒ i.	℥ ss.	℥ i.	
Aqua hydrosulphurica	℥ ss.	℥ i.	℥ iss.	
Aqua laurocerasi	ʒ ss.	ʒ i.	ʒ iv.	
Aqua picis	℥ i.	℥ iij.	Oi.	Sometimes also undiluted.
Argenti nitras				
Bromum et potassii bromidum	aa gr. xv.	—	—	
Extractum belladonnæ	gr. i.	gr. ij.	gr. iv.	
Extractum conii	gr. iv.	gr. viij.	gr. xij.	
Extractum hyoscyami	gr. iv.	gr. viij.	gr. xv.	
Extractum opii	gr. i.	gr. iv.	gr. viij.	
Extractum stramonii	gr. i.	gr. iv.	gr. viij.	
Glycerinum	—	—	Oi.	Sometimes undiluted.
Hydrargyri chloridum corrosivum	gr. i.	gr. ij.	gr. v.	

	Dose of the Remedy.			
Infusum sambuci, tibiæ, etc.	ʒ i.	ʒ iiss.	ʒ v.	
Iodum	gr. ss.	gr. i.	gr. ij.	Added to the solution of iodide of potassium given below.
Liquor calcis	—	—	—	Clear or diluted with 2–4 parts of water
Liquor ferri chloridi	♏xv.	ʒ i.	ʒ iv.	
Liquor potassæ	ʒ ss.	ʒ iiss.	ʒ x.	
Liquor potassii arsenitis	♏viij.	♏xv.	♏xlv.	
Liquor sodæ	ʒ ss.	ʒ iiss.	ʒ x.	
Lithii carbonas	gr. xv.	ʒ ss.	ʒ iiss.	
Morphinæ hydrochloras	gr. i.	gr. ij.	gr. iv.	
Oleum eucalypti	—	—	℥ ss.	With alcohol, ℥ ij., in 10–30 drops undiluted.
Oleum pini	♏viij.	ʒ ss.	ʒ iiss.	Or 10–30 drops pure.
Oleum terebinthinæ	♏viij.	ʒ ss.	ʒ iiss.	Or 10–30 drops pure.
Plumbi acetas	gr. xxiv.	ʒ i.	ʒ iiss	
Potassii bromidum	gr. xv.	ʒ ss.	ʒ iiss.	
Potassii carbonas	ʒ ss.	ʒ i.	ʒ iiss.	
Potassii chloras	gr. xv.	ʒ ss.	ʒ iiss.	
Potassii iodidum	gr. xv.	gr. xxiv.	gr. xl.	
Potassii permanganas	gr. viij.	gr. xv.	ʒ i.	
Pyridinum	—	—	—	10–15 drops undiluted.
Quininæ hydrochloras	gr. xxiv.	—	—	
Sodii benzoas	ʒ iiss.	ʒ v.	℥ i.	
Sodii bicarbonas	gr. xx.	gr. xl.	gr. lxxx.	
Sodii boras	gr. xv.	ʒ ss.	ʒ i.	
Sodii carbonas	gr. viij.	gr. xv.	gr. xxx.	
Sodii chloridum	gr. xv.	ʒ ss.	ʒ i.	
Thymolum	gr. iv.	gr. viij.	gr. xij.	
Tinctura cannabis indicæ	♏viij.	♏xv.	ʒ i.	
Tinctura conii	♏viij.	♏xv.	ʒ i.	
Tinctura iodi	♏ij.	♏iv.	♏viij.	In alcohol, ʒ xij.
Tinctura opii	♏iv.	♏xv.	ʒ i.	
Zinci sulphas	gr. viij.	gr. xxiv.	ʒ i.	

In many spas, as Ems, Nenndorf, Kissingen, Weilbach, Wipfeld, and others, the waters are inhaled pure or diluted with simple water.

V.

THERAPEUTIC NOTES.

For a description of the physiological actions, therapeutic uses, and dosage of the drugs mentioned in this chapter, the reader is referred to Part II., where the remedies are treated of in alphabetical order.

I. DISEASES OF THE RESPIRATORY ORGANS.

Diseases of the Nose.

CORYZA, RHINITIS ACUTA.

When the weather is raw the patient should keep to his room. Diaphoresis is to be provoked by means of a teaspoonful of solution of acetate of ammonium in a glass of elder-tea, and by the vapor bath. A cold may sometimes be aborted within the first two hours by means of a snuff containing half a grain of morphine, taken in several pinches at intervals, or by Hager's coryzarium (see Acidum Carbolicum). It is also useful to snuff in the form of spray a one-half to one per cent solution of common salt or of carbonate of sodium with a little glycerin.

CORYZA CHRONICA (OZÆNA).

The crusts should be removed two or three times a day by means of tepid nasal douches of a weak solution of carbonate of sodium, with or without glycerin; then one of the following should be applied on a brush or by injection: Tannin (1:200), sulphate of zinc (1:300); or a solution of nitrate of silver (gr. iv.–xxx. to the ounce) may be applied every two or three days; iodine, iodide of potassium, and salol have also been recommended. The mucous membrane may be painted with a con-

centrated chlorate of potassium solution. Iodoform (1 part to 100 of paraffin ointment) may be applied to the mucous membrane, astringent salves and suppositories may be used, or the galvano-cautery may be employed. The dry and atrophic forms, however, do not do well with astringents. If the disease is dependent upon syphilis, sublimate solutions may be used, or snuffs of calomel or red precipitate. General treatment is also to be instituted.

EPISTAXIS, RHINORRHAGIA.

Snuffing up cold or iced water, to which may be added, if necessary, vinegar, alum, or liquor ferri chloridi (1:100). Nasal douches of ice-water. Injections through a glass syringe of fresh lemon juice. Compression of the nose, or stopping the bleeding nostril with surgeon's agaric, lint, gossypium hæmostaticum, or iodoform cotton (anterior tamponade), or a tampon of the nose by means of Bellocq's sound or the rhineurynther. A good tampon can be made by means of a condom, or a piece of fresh pig's gut, introduced on the end of a catheter and then blown up. Compression of the carotid may be necessary. The upright posture with the head slightly bent; cold applied to the nose and forehead, neck, scrotum, or chest; or raising the arm on the bleeding side, while the fingers of the other hand make compression on the nose, one or all, may be tried; or a powder of tannin and acetate of lead may be snuffed up. (The resulting coagulum should not be disturbed for some time.)

Internally, ergot may be given in doses of gr. viij. every half hour, ergotin (also subcutaneously), fluid extract of hydrastis, acetate of lead; or a tablespoonful every half-hour of one ounce of sodium sulphate in four ounces of water. Acid drinks may be given.

Among the causes of the hemorrhage, which will require treatment, are diseases of the nose, anæmia, and the hemorrhagic diathesis. In intermittent epistaxis quinine is indicated. When nose bleed occurs frequently in the early stages of tuberculosis and in connection with heart disease a tablespoonful of infusion of digitalis (half a drachm to four ounces) may be given every two hours.

Diseases of the Larynx and Bronchi.

LARYNGITIS.

1. Acute Catarrhal Laryngitis.

Pure warm air of an even temperature (70° to 72° F.) in the living apartments. Hot water compresses or poultices or cold (Priessnitz) compresses around the neck and kept on for six or eight hours, while sweating is produced by warm drinks, hot milk or whey mixed with equal parts of Seltzer water. Diaphoretics may also be given, as well as narcotics when the cough is troublesome. Mucilaginous and saccharine substances must be given sparingly.

When the throat is very dry, warm inhalations, of short duration, but frequently repeated, may be ordered of water with or without (in strength of three-tenths to one per cent) carbonate, bicarbonate, or chloride of sodium, chloride of ammonium, or sulphate of zinc, to which may be usefully added a little morphine, or bitter almond water. Internally, in the same condition, chloride of ammonium and solution of anisated ammonium are to be employed. In severe inflammatory forms, only cold compresses should be used, with sinapisms (and leeches over the region of the larynx); intestinal derivation by means of purgative salts.

The patient should avoid loud talking and forced cough.

Pseudo-croup.—The same measures as in acute laryngitis, and in addition cold moist compresses about the neck, and an emetic (tartar emetic, gr. ½, and ipecac and sugar each gr. viij., repeated every ten minutes until vomiting has been produced several times). Hot milk is to be taken as a drink.

2. Chronic Catarrhal Laryngitis.

Local applications, guided by the laryngeal mirror, of nitrate of silver (three to six per cent solution), tannin (about ten per cent), or tincture of iodine. Avoid the use of nitrate of silver, however, in phthisis. Less useful are sprays and powders, although insufflations of calomel once or twice a week, with occasional longer intermissions, are useful in syphilitic laryngitis. When swallowing is very painful, bromide of potassium (gr. xv.–xxx.) may be employed, or local applications of a five-per-cent cocaine solution.

Warm inhalations twice a day of water containing salt, tannin (gr. x.–℈ i.), or alum (ten per cent); or when cough is troublesome, laudanum (℥ i.–ij. to ℈ iij.).

When due to syphilis or phthisis, the treatment of the causal condition is indicated; when plethora exists, saline laxatives are to be given and the mineral waters of Ems or Nenndorf, or, in the case of the poor, solutions of bicarbonate of sodium or sulphurated potassa.

Spirituous liquors, strong spices, smoking, much talking, and impure air are to be strictly avoided.

3. Phlegmonous Laryngitis and Acute Perichondritis, Abscesses and Ulcers of the Larynx.

Antiphlogistics (ice, leeches); local applications of astringents (nitrate of silver three to five per cent); inhalation of tannin or narcotic solutions; derivatives, such as saline or drastic cathartics, irritant foot-bath, and blisters; and when suppuration is present, warm compresses or poultices. Submucous abscesses should be opened by the knife, or, in the case of timid patients, an emetic may be given to cause the rupture of the abscess.

For catarrhal and tuberculous ulcers of the larynx inhalations of tannin, alum, or sulphate of zinc; or insufflations of iodol. Syphilitic and tuberculous ulcers call also for general treatment.

4. Idiopathic Croupous Laryngitis. Membranous Sore Throat (Croup).

Ice compresses, and sucking broken ice in the mouth or frequent draughts of ice-water. In persons with very strong constitutions, when there is dyspnœa coming on very rapidly, and fever, a few leeches may be applied to the neck at the side of the larynx or over the manubrium sterni, and after the bites have been allowed to bleed for a while, the ice compresses are to be again applied to the throat.

Cold douching of the neck and back, if desired in a warm bath. An emetic may be given either of tartar emetic and ipecac, as above, or of sulphate of copper (gr. ij.–℥ xij. water, of which a dessertspoonful every ten minutes). Frequent inhalations of lime water or solutions of bromine, lactic acid,

or carbonate of lithium. When children cannot be made to inhale from the cylinder of the atomizing apparatus, they may be wrapped up in a sheet, held in the lap and the apparatus held over the mouth and nose, the precaution being taken to cover the eyes. For such a purpose an apparatus must be used in which the flame is guarded by a shield. Local applications of nitrate of silver solution. Inunctions of mercurial ointment for several days, made in the same way as in the inunction treatment of syphilis.

Internally, oil of turpentine, chlorate or carbonate of potassium, and bromides. Possibly tracheotomy may be demanded, the inhalations then being practised through the canula.

ŒDEMA OF THE GLOTTIS.

First of all an emetic; then ice compresses about the neck, swallowing broken ice, local application of a ten-per-cent solution of nitrate of silver, or better, prompt scarification of the swollen parts. If the danger is very great, tracheotomy must be performed.

SPASM OF THE GLOTTIS, LARYNGOSPASM.

General Measures.—Cold lotions, fresh air, salt-water and peat baths, cod-liver oil, iron, good food. Feather pillows should not be used. Any constitutional causes should receive their appropriate treatment.

Treatment of the Attack.—Lifting the child upright, sprinkling with cold water, vinegar or chamomile-tea enemas; tickling the soft palate until retching is excited; application of mustard plasters; cocaine or chloroform inhalations, or the local application of cocaine.

When the attacks recur frequently, tincture of myrrh (5 drops three times a day) will be found useful, or enemas of asafœtida; chloral in 8-grain doses, and bromide of sodium.

PARALYSIS OF THE VOCAL CORDS.

Diagnosis.—Chronic hoarseness or aphonia, and the detection through the laryngoscope of deficient or unsymmetrical movements of the parts.

Treatment.—Electricity, strychnine, iron, derivatives.

WHOOPING-COUGH.

See Infectious Diseases.

BRONCHITIS AND TRACHEITIS.

1. Acute Catarrhal Bronchitis.

In cases of acute apyretic bronchial catarrh the patient should be confined to a room with equable temperature day and night, wear woollen underclothing, and drink an abundance of warm beverages to keep up a mild diaphoresis.

When the cough is dry and troublesome, Dover's powder may be given, or a tablespoonful every two hours of the following:

℞ (Ant. et pot. tartr., ... gr. $\frac{1}{3}$)
Aq. amygdalæ amaræ, ... ʒ ss.
Ext. glycyrrh. fluidi, ... ʒ iiss.
Decocti althææ, ... ℥ v.
M.

Inhalations of salt water (a teaspoonful of salt to a cup of warm water), or of warm solution of carbonate of sodium, with narcotics if desired; later astringents.

When moderate fever is present, the patient should stay in bed and take a mild laxative; in case of high fever, infusion of digitalis, or better salicylate of sodium should be given.

In bronchitis of the aged, infusion of senega with solution of anisated ammonia, and perhaps Dover's powder, is indicated. When there is difficulty in raising the mucus, an emetic should be given; when the secretion is too profuse, tannin and opium are called for.

Seltzer water and hot milk should be drunk.

2. Chronic Catarrhal Bronchitis.

Causal treatment consists in a change of climate or occupation (workers in a dust-laden atmosphere should wear a cotton respirator), and constitutional treatment for scrofula, rickets, syphilis, plethora, etc.

When the heart's action is slow from overloading of the right ventricle, digitalis is indicated.

Inhalations may be given of alkalies, salt, narcotics, alum, tannin, etc.

Pneumatic treatment consists in the inspiration of compressed air and expiration into a rarefied atmosphere. The compressed air, which is an excellent remedy for the relief of hyperæmia in the pulmonary circulation, may be impregnated with the vapor of carbolic acid, oil of turpentine, etc.

Internal treatment consists in the use of alkaline and alkaline muriatic (also sulphur) mineral waters, the grape-cure or whey-cure. In congestions Carlsbad, Marienbad, or other laxative waters may be given, or herb-cures with water-cress, scurvy-grass, sorrel, etc.

Expectorants.—The antimonials, especially in dry catarrh, oil of turpentine internally and applied to the chest; painting the chest with tincture of iodine. Emetics are indicated in severe cases of suffocative catarrh; and emetics, stimulants, and derivatives in weakness of the bronchial muscles threatening paralysis.

3. Bronchorrhœa and Bronchiectasia.

Resinous astringents (myrrh, ammoniac, balsam of Peru) and also acetate of lead and tannin; tonics (vegetable bitters, blessed thistle); and small doses of iodide of potassium.

In putrid bronchitis, carbolic acid, quinine, and acetate of lead should be given.

Inhalations of oil of turpentine, carbolic acid, tar water, permanganate of potassium, alum, tannin, tar vaporized by being dropped on hot iron, and the balsamic air of the forests.

4. Croupous or Fibrinous Bronchitis.

(Expectoration of membranous casts of the smaller bronchi, seen especially in children after measles and whooping-cough and in the aged.)

Topical Treatment.—Inhalation of solvents (lime water, carbonate of lithium, lactic acid) and astringents.

Internally expectorants and emetics, iodide of potassium; and mineral waters for long-continued use.

CAPILLARY BRONCHITIS.

Pure moist air; 5 drops of oil of turpentine in warm milk three or four times a day; senega and the ammonium salts; emetics (apomorphine) when expectoration is difficult. In the

case of weak, anæmic children, when collapse threatens, a little musk may be given, or small doses (8 to 12 drops every three or four hours) of Hungarian wine, combined with a nourishing diet. Sinapisms may be of service.

The fever is to be combated with a weak infusion of digitalis or with salicylate of sodium, and the respiration is to be stimulated to activity by moderately warm baths (with cold douches), carrying the child about constantly, and not letting it lie on its back. In regard to the douches, the inspiratory movements are greatly stimulated by directing a cold stream to the back of the head over the medulla oblongata.

BRONCHIAL (NERVOUS OR SPASMODIC) ASTHMA.

(Sometimes associated with the presence of pointed octahedral crystals, of microscopic size, in the sputum.)

Pure, dry, warm air. A comfortable and well-supported upright posture. Counter-irritation.

To abbreviate the attack: Morphine subcutaneously, chloral, and inhalation of chloroform, as simple narcotics; and inhalation of stramonium fumes (in powder or cigarettes), as both narcotic and expectorant. As specific remedies are further recommended: Paraldehyde (hypnotic, but not anti-asthmatic); hydrochlorate of hyoscine (like the preceding, but weaker in its action, and necessitating more care in its exhibition); nitrite of amyl (a few drops on a handkerchief, to be inhaled), nitrite of sodium (one or two teaspoonfuls p. r. n. during the attack, of a solution of gr. xxiv. in ℥ iij. water), and nitro-glycerin, all uncertain in their action; also tincture of quebracho, which is apt to nauseate; grindelia robusta, etc.; more certain, but on account of the odor very disagreeable, are inhalations of pyridin; sometimes a local application of a ten-per-cent solution of cocaine to the mucous membrane of the nose and pharynx is of service.

Finally, electricity and galvano-cauterization of the nasal mucous membrane are recommended. (Not infrequently nasal and pharyngeal polypi, and sometimes also hypertrophied tonsils, are found to be the cause of the asthmatic attacks. The most certain remedies are iodide of potassium and chloral, of each 24 grains, given once or twice at half-hour intervals during the attack, and three times a day for several months

thereafter. When the attacks have ceased to recur, iodide of potassium may be continued as an after-treatment.

Treatment of the resultant emphysema consists in the avoidance of severe bodily exercise or mental strain; change of climate; and inhalations of a weak saline solution. Terpin hydrate is given in doses of gr. iij.–viij. three or four times a day in dry catarrhs, and in doses of gr. viij.–xij. when there is profuse secretion. The pneumatic treatment demands special apparatus or the cabinet.

Diseases of the Lungs.

EMPHYSEMA.

Mechanical assistance to expiration by pressure on the thoracic and abdominal walls applied by means of the hands two or three times a day, twenty to thirty expirations being made at each sitting; or inspiration of compressed, and especially expiration into rarefied, air effected by means of one or other of the pneumatic apparatuses. Symptomatic and prophylactic treatment of the accompanying catarrh consists in the use of woollen underclothing, the avoidance of spirituous liquors or strong beer, the breathing of pure, warm, moist air, especially sea air.

The dyspnœa is to be treated according to the directions above given for the management of asthma. For long-continued use bromide of sodium may be given. The diet should be nutritious, and the bowels should be kept regular by means of compound licorice powder or other similar laxative.

ATELECTASIS.

The first condition of cure is to increase the force of respiration—in the new-born by means of cold douching in a warm bath, tickling of the throat and of sensitive parts of the body, and if necessary an emetic (syrup of ipecac or oxymel of squill); in adults by removal as quickly as possible of the causal conditions.

HYPERÆMIA OF THE LUNGS.

Symptoms.—Oppression in the chest, difficult respiration, palpitation of the heart.

Treatment.—Avoidance of the causes, counter-irritation,

cold or Priessnitz compresses, inspiration of compressed air (see under Bronchitis), digitalis, laxatives, and according to circumstances stimulants. When amenorrhœa is present, leeches may be applied to the cervix, or to the inner sides of the thighs and ankles.

HÆMOPTYSIS.

Absolute rest, bodily and mental, deep slow inspirations, dry, or in severe cases, wet, cups, and ice-bags to the chest; common salt, extract of ergot with morphine subcutaneously or by the mouth, or ergot and acetate of lead with opium, ipecac, alum, sulphate of atropine, sulphuric-acid mixture, solution of chloride of iron, hydrastis. Among the more strongly recommended domestic remedies are constriction of the limbs by means of broad bands applied over the ankles, knees, elbows, and upper arms tightly enough to compress the veins, but not the arteries, and swallowing of salt in tablespoonful doses.

Inhalations of a solution of chloride of iron (20 drops to three ounces of water), and oil of turpentine.

Carbonic acid, digitalis, and a stimulating diet are to be carefully avoided.

PULMONARY TUBERCULOSIS.

See Infectious Diseases.

PULMONARY INFARCTION, EMBOLISM OF THE PULMONARY ARTERY.

(Arising from embolism of the venous system, from phlebitis, or from disease of the right side of the heart.)

The treatment is for the most part symptomatic; most absolute bodily and mental rest, pure air, hypodermic injections of morphine, ice-bag over the region of the heart, and, when there is great dyspnœa with cyanosis, venesection.

CATARRHAL (LOBULAR) PNEUMONIA, BRONCHO-PNEUMONIA.

It is always a sequela of bronchitis and is usually bilateral; occasions rapid respiration and pain on breathing and coughing; is attended with greater dyspnœa, but never the high temperature (104° F.) of croupous pneumonia (which see); the

fever has, however, considerable daily excursions with evening exacerbations. The consolidation proceeds usually from the base to the apex of the lung. Instead of the occasionally absent dulness on percussion, there are heard numerous râles. Resolution does not occur by crisis on the fifth or seventh day, but gradually and irregularly on the fourth, fifth, or a later day.

The treatment is at first that of bronchitis; ice; an emetic to favor the expectoration of the retained mucus, but only in the case of strong persons. For weak patients a warm bath with tolerably cold douching of the back of the neck, infusion of ipecac with solution of anisated ammonia, and the enveloping of the chest in warm, moist (occasionally cold) compresses for six or eight days, and mustard plasters. When there is high fever, antifebrin, antipyrine, phenacetin, or quinine may be given, and wine in case of collapse. The diet should be light but nutritious.

CROUPOUS (FIBRINOUS, LOBULAR) PNEUMONIA.

See Infectious Diseases.

ŒDEMA OF THE LUNGS.

A large blister on the chest; stimulant expectorants, such as senega with benzoin, camphor, or carbonate of ammonium; derivatives. When dropsy exists, diuretics and drastic cathartics are indicated; and, in protracted cases, digitalis.

In idiopathic œdema of the lungs, powerful stimulants, such as black coffee, wine, champagne, musk, sinapisms to the chest, and half-hourly to hourly injections of ether or camphorated ether. In inflammatory œdema occurring with pneumonia, venesection may be practised as a last resort, but an emetic should never be given.

GANGRENE OF THE LUNGS.

Inhalations of turpentine vapor (oil of turpentine poured into hot water), or of a two-per-cent solution of carbolic acid; and internally a one-quarter-per-cent solution of carbolic acid, or better tablespoonful doses of a two-per-cent solution of boric acid sweetened with syrup; also chloride of calcium and opium:

℞ Pulv. opii, ... gr. xv.
Calcii chloridi, ... gr. xlv.
Ext. glycyrrhizæ, ... q.s.
M. et ft. pil. No. 20. S. From two to four pills a day.

Tonics, quinine, and wine are indicated. In case of hemorrhage, ice should be applied to the chest, and ergot given.

Diseases of the Pleura.

PLEURISY.

In acute pleurisy the patient should keep strictly to the bed, with Priessnitz compresses applied to the entire chest; and in case of high fever, antipyretics are to be given. For heart weakness, stimulants are indicated; and for dyspnœa with severe pleuritic pains, dry cups should be applied, with, if necessary, hypodermic injections of morphine. The bowels must be looked after. Venesection and the exhibition of mercurials are superfluous and often harmful.

To cause resorption of the effusion, in strong patients, intestinal derivation by means of drastic cathartics (six or eight stools) and counter-irritation to the chest by tincture of iodine, mustard plasters, and blisters. Diuretics and diaphoretics, and especially the so-called thirst-cure are to be used with caution. In weak persons the treatment should be strengthening by means of cod-liver oil, iron, meat broths, chops, and wine. Diuretics and especially iodide of potassium (a tablespoonful three times a day of a solution of ʒ ss. in ℥ iv. of water). A milk-cure in the country or in hilly regions may be of service. Pulmonary gymnastics are also called for.

When these methods fail, slight effusions which do not reach up to the nipple may be left to themselves to be absorbed. Larger sero-fibrinous exudations must be removed as soon as possible by thoracentesis, as must also rapidly formed effusions which seriously impede respiration or threaten life. In the case of purulent or septic exudations, the diagnosis being established by an exploratory puncture, the pus must first be removed by aspiration, and then the chest wall is to be opened, resection of one or more ribs being made, if necessary. The operation should be performed under strict antiseptic precautions.

PNEUMOTHORAX AND PYOPNEUMOTHORAX.

The treatment is symptomatic and palliative; cold compresses and morphine for the relief of severe pain; leeches only in strong patients and in pneumothorax from traumatism. For the dyspnœa and pain, small hypodermic injections of morphine and the internal exhibition of mild antiphlogistics are indicated, and attention should also be paid to keeping the bowels open. The diet should be nutritious and easily digestible.

In case of need, a simple puncture of the chest may be made or thoracentesis may be performed after four or five days.

II. DISEASES OF THE DIGESTIVE ORGANS.

Diseases of the Mouth and Pharynx.

CATARRHAL STOMATITIS.

Causal indications are: removal of sharp edges of broken teeth, avoidance of tobacco and of irritating spices and medicaments.

For the treatment of the affection itself, mouth washes of common salt, chlorate of potassium (two per cent), or tincture of galls are to be employed; cold drinks are to be taken; and drastics, with the exception of calomel, may be called for.

For loose and receding gums, painting with equal parts of tincture of iodine and tincture of aconite, or cauterization with chloride of zinc solution (by the passing in of a fine camel's-hair pencil moistened in the solution) will be found useful.

ULCERATIVE STOMATITIS.

1. Aphthous Stomatitis.

The treatment consists in touching the ulcers with nitrate of silver or hydrochloric acid (1:3), frequent rinsing out the mouth with water or with sublimate solution (1:5,000), and the internal administration of chlorate of potassium (with care, however).

2. Idiopathic Stomatitis (Stomacace).

Chlorate of potassium internally (℥ ss. a day for adults, and gr. viij.–xv. for children) and as a mouth wash for adults; for children careful cleansing of the oral cavity; astringents such as tincture of galls, sulphate of copper, or solution of the chloride of iron.

3. Mercurial Stomatitis (Salivation).

Discontinue at once the use of mercury. Give iodide or chlorate of potassium internally (a tablespoonful every hour of a solution of ℥ ss.: ℨ iv.); apply warm poultices to the neck; and use warm gargles of 8 grains of alum to 4 ounces of sage tea or other vehicle. The teeth should be carefully cleaned several times a day with one of the following powders:

℞ Acidi lactici, ... ♏xv.
Magnesii carb., ... ʒ i.
Ol. menth. pip., ... gtt. x.
M. et ft. pulvis.

Or,

℞ Acidi salicylici, ... ℥ ss.
Magnesii carb., ... ʒ i.
M. et ft. pulvis.

SCORBUTIC STOMATITIS.

See Scurvy, under Infectious Diseases.

APHTHÆ.

Chlorate of potassium internally and as a mouth wash; painting with diluted tincture of galls or with a weak nitrate of silver solution, or if necessary, touching the ulcers with the solid stick.

THRUSH.

By way of prophylaxis the mouth should be carefully kept clean by washing out with fresh water or with red wine and water, and the nipples should also be cleaned after each nursing. The same course is to be followed if thrush is already developed, or the mouth may be washed out with solutions of

chlorate of potassium or of bicarbonate of sodium, or with a four or five per cent borax solution.

TOOTHACHE.

When due to inflammation of the pulp, the carious cavity should be treated with carbolic, hydrochloric, or nitric acid, arsenic, chloride of zinc, or creasote. Chlorate of potassium may be applied in substance, or a pledget of cotton wet with a 1:15 bicarbonate of sodium solution, or equal parts of carbolic acid and flexible collodion, or finally a warmed mixture of 8 grains of cocaine in 40 grains each of chloral and camphor. A concentrated solution of chlorate of potassium may be employed as a mouth wash.

The extraction of the teeth in these cases is less clearly indicated and more difficult than in inflammation of the periodontium. Here the gum is to be painted with tincture of iodine, alone or mixed with equal parts of tincture of aconite; a pledget of cotton wet with this mixture may be inserted into the cavity; or one or two leeches may be applied to the gum; the formation of pus may be hastened by poulticing, and the pus should be evacuated by lancing when formed.

In all cases a very mild faradic or galvanic current may be used, or narcotic substances may be applied (toothache-pills, crystals of chloral, chloroform, ether); or camphor, oil of cloves, or compound tincture of spilanthes (Para cress) may be used, partly in the cavity and partly, for the derivative effect, on the cheek or in the external auditory canal. Other remedies are morphine injected into the neck, opium smoking, and veratrine.

When the toothache proceeds from a cold, diaphoresis may be provoked by the Roman bath, and irritating foot-baths may be used; in cases of congestion, chloral or any other active anæsthetic or hypnotic may be employed.

PARENCHYMATOUS GLOSSITIS.

Broken ice on the tongue, ice-bags and leeches to the submaxillary region; long, deep incisions on the dorsum of the tongue, or the application of leeches directly to the organ. Painting with tincture of iodine. Laxatives. Opening of abscess if it exists. Finally tracheotomy may be necessary.

NOMA.

Chlorate of potassium; disinfectant injections; cauterization with concentrated hydrochloric acid; rinsing the mouth with a solution of salicylic acid, gr. xv. in ℥ ss. each of alcohol and water; local application of turpentine on lint; scraping away the diseased portion under anæsthesia. The diet should be of the most nourishing character, and the following may be given internally:

℞ Potassii chloratis, ... ʒ ss.–i.
Ext. cinchonæ, ... ʒ ss.
Syr. aurant. cort., ... ʒ iv.
Aq. destillatæ, ... ℥ v.

M. S. A dessertspoonful to a tablespoonful several times a day.

TONSILLITIS, INFLAMMATION OF THE SOFT PALATE AND FAUCES.

1. Catarrhal Angina.

Cold is of service only when externally applied (at the angle of the jaw), and for gargles tepid mucilaginous and weakly astringent decoctions are most useful. *Internally* carbonate of potassium may be given in solution.

Abortive Treatment.—An emetic is often serviceable if given within the first three days; alum powder may be applied to the inflamed parts; or they may be painted with a one to two per cent solution of nitrate of silver or with tincture of iodine.

In the chronic form, gargles of very hot water, application of solution of nitrate of silver (the strength being proportioned to the severity of the case), the galvano-cautery, amputation of the tonsils, and the use of various mineral waters (Ems, Kissingen, etc.) are of service.

2. Phlegmonous Tonsillitis.

At first the treatment should be antiphlogistic, ice to the angle of the jaw, or if necessary, leeches at the same point. Flat pieces of ice wrapped in a cloth, or compresses wet with cold water, applied to the angle of the jaw by means of a

bandage passing over the head, reduce the pain and inflammation better than any other remedy. When the swelling is very great and shows no disposition to subside, numerous and repeated scarifications of the tonsils should be practised. If the formation of an abscess appear to be inevitable, warm gargles and poultices should be used, and in any event these are more pleasant in the later stages and tend to hasten resorption of the infiltration.

When fluctuation is distinct (peritonsillar abscess) the pus must be evacuated by an incision.

3. Chronic Parenchymatous Angina (Hypertrophy of the Tonsils).

Painting the tonsils with tincture of iodine, or injecting iodine into the parenchyma; insertion of minute crystals of chromic acid into the crypts (with care); tonsillotomy.

4. Diphtheritic Angina.

See Diphtheria, under Infectious Diseases.

PHARYNGITIS.

1. Acute Catarrhal Pharyngitis.

Is usually associated with tonsillitis or posterior nasal catarrh, and is to be treated in the same way as these affections.

2. Chronic (Granular) Pharyngitis.

The withdrawal of whatever tends to prolong the condition (smoking, drinking, much talking), and measures leading to the cure of constitutional causes.

Cleansing and astringent gargles and sprays; painting with nitrate of silver solution or sulphate of zinc (three to ten per cent solution) two or three times a week. The single granulation should be touched with nitrate of silver in stick, or tincture of iodine, or gargles of sublimate solution may be used.

Finally a course of treatment at Ems, Marienbad, Kreuznach, or Aachen.

POSTERIOR NASAL CATARRH, NASO-PHARYNGEAL CATARRH.

Acute form: frequent snuffing up of warm saline solution or milk, better done by means of Weber's nasal douche, or inhalations of a spray of chloride or carbonate of sodium solution (Ems water, etc.); Hager's olfactorium (see Acidum Carbolicum in Part II.).

Chronic form: nasal douching (less useful, gargling) several times a day with solution of cloride or carbonate of sodium, and after the condition has existed for weeks with borax (from five per cent upward) or sulphate of zinc (1:1,000); applications through the pharynx by means of a curved brush of nitrate of silver solution or sulphate of zinc (1:30); insufflation of alum with gum Arabic, or carbonic acid douches; iodide of potassium even in the absence of a syphilitic taint; galvano-cautery; and change of climate.

ŒSOPHAGITIS.

A mucilaginous and liquid diet. When the pain is severe leeches may be applied to the neck, pieces of ice may be sucked, or morphine with bitter almond water may be given. Laxatives are indicated. Warm foot-baths will be of service, and tincture of iodine may be painted over the course of the œsophagus and in the supra-sternal fossa.

PAROTITIS.

1. Idiopathic (Epidemic Contagious) Parotitis, Mumps.

The treatment is expectant, or at most rubbing with oil or some indifferent fatty ointment, and covering with cotton. Laxatives are useful, and possibly jaborandi. When metastasis to the testicles threatens or has taken place, the patient should lie in bed with the scrotum supported.

2. Metastatic Parotitis.

At the beginning careful catheterization of the salivary duct. Poultices should be applied and any fluctuating points opened at once. For the induration an application should be made of equal parts of tincture of iodine and alcohol.

LUDWIG'S ANGINA. PSEUDO-ERYSIPELAS SUBTENDINOSUM COLLI.

Energetic antiphlogistic treatment, leeches, moist heat, subfascial injections of carbolic acid. Later surgical treatment by means of long and free incisions, and finally tracheotomy may be necessary.

Diseases of the Stomach.

CATARRHAL GASTRITIS, GASTRIC FEVER.

1. Acute Gastritis.

Starchy or saccharine food, and a tablespoonful hourly of 20 drops of hydrochloric acid in 4 ounces of water; later mucilaginous broths, soft-boiled eggs, meat broths. (See below Leube's Diet List, and Caro in Part II.).

The removal of harmful ingesta, when necessary, by means of emetics or cathartics: ipecac or tartar emetic, or better, apomorphine; still better is washing out the stomach with carbonate of sodium or saline solutions; for laxatives, rhubarb, Carlsbad salts, calcined magnesia, or podophyllin.

To assist the weakened digestion, aromatic or bitter tincture or tincture of nux vomica (20 to 25 drops during the day); pepsin, gr. v.–vi., with hydrochloric acid, 5 to 6 drops, shortly before, or, better, after meals. For the anorexia and oppression in the stomach, subnitrate or salicylate of bismuth, gr. iss., with bicarbonate of sodium, gr. iij.

In the case of anæmic persons, convalescents, or the aged, neither emetics nor cathartics should be used, but rather stimulants and aromatics; pepsin with hydrochloric acid; scraped raw meat, beef peptones, and other nourishing easily digestible food.

In the case of children milk must be avoided and in its place should be given toast-water with lean veal or pigeon broth. For remedies may be given hydrargyrum cum creta, tincture of rhubarb with carbonate of potassium in fennel water, and hydrochloric acid. If the patient has taken cold, diaphoresis should be procured.

In gastro-intestinal catarrh, especially in children (gastric fever), the diet should consist at first of starchy or saccharine

matters, barley or oat-meal water, and meat broths and milk may be gradually added.

For hyperemesis and pain, broken ice, narcotics, and counter-irritation are indicated.

2. Cholera Nostras.

See Infectious Diseases.

3. Chronic Gastritis.

The chief symptom is chronic dyspepsia.

Causal treatment: for constipation and hemorrhoids, laxatives or Carlsbad, Marienbad, or Homburg waters; in affections of the heart and circulatory system, digitalis; those who lead sedentary lives should take walking exercise. When the yeast fungus or sarcina is present, washing out the stomach is indicated.

Leube's Diet for Dyspeptics.—The greatest attention should be paid to the diet, for the regulation of which the following list of Leube is the best.

I. Boiled milk, meat broths, bouillon, softened toast (not sweetened zwieback), English cakes, natural Selters water.

II. Soft-boiled and raw eggs, rice and sago in milk (cooked soft), light soups (barley soup, egg soup, etc., but without any whole barley or other grains or vegetables in it), calves' brains, sweetbread, boiled chicken and pigeon.

III. Boiled calves' feet, scraped raw ham, scraped beefsteak (very rare), mashed potatoes, soft-boiled rice with bouillon, crackers, little coffee and tea.

IV. *a.* Oysters, rare roast-beef especially cold, roast chicken or pigeon without gravy, also better cold, venison, partridges long hung, a little white bread, maccaroni.

b. Caviar, boiled pike, hare, roast veal best cold, very simple desserts (stewed apples, fruit jellies). Strong pure wine not sweet.

When the gastric juice is deficient in quantity: alkalies (mineral waters), bitters (calamus, gentian, columbo, condurango, trifolium fibrinum, strychnine), hydrochloric acid, seldom pepsin. The body, especially the abdomen and feet, should be kept warm. Warm baths are useful.

Symptomatic Treatment.—Antacids, antifermentatives, narcotics, derivatives, laxatives (rhubarb, aloes, colocynth),

tonics, iron. Of doubtful utility are the astringents (bismuth, nitrate of silver, sulphate of zinc—on an empty stomach).

If there is no appetite and the bowels are irregular, pain being absent, then bitters (columbo, condurango, kino) may be given, and also nux vomica with rhubarb, and nutmeg.

For the gastric catarrh of drunkards, opium with bismuth, solution of nitrate of silver, lime water, or a few drops of tincture of iodine.

Fermentation should be restrained by the appropriate remedies (subcarbonate or salicylate of bismuth, creasote, benzin, thymol; or by removing the offending materials with the tube, washing out the stomach, and then giving Carlsbad salts or Marienbad, Kissingen, or other similar mineral water with milk; carbonate of sodium with morphine; bismuth with opium. Warm whey, ipecac, apomorphine.

4. Toxic Gastritis.

As a general rule, irrespective of the nature of and proper antidote for the particular poison, the stomach pump is the first thing to employ. In poisoning by acids carbonate of magnesium or of potassium should be given as quickly as possible; by alkalies, sulphuric acid in oatmeal gruel or vinegar must be given and in sufficient amount to neutralize the alkali. If it is too late to attempt to neutralize the poison, then ice may be sucked in the mouth and also applied over the region of the stomach, and narcotics are to be given if necessary. Bougies may be used to dilate or prevent the formation of a stricture of the œsophagus.

In the case of poisoning by slowly acting vegetable or mineral substances, sulphate of copper and other emetics are to be given, or apomorphine subcutaneously (gr. $\frac{1}{3}$ in glycerin, ʒ ss., and water, ʒ iiss.), and substances to protect the mucous membrane, raw white of egg. (See under Poisoning.)

DYSPEPSIA.

Medicinal Treatment.—Mild laxatives (and emetics), the stomach tube, antacids, digestives and carminatives, calamus, carbonic acid, creasote, salicylic acid, hydrochloric acid, pepsin, chloride of sodium, ipecac, strychnine.

Dietetic Treatment.—See Chronic Gastritis. (*Conf.* also

Caro in Part II., and Leube's Diet List in the preceding section.)

VOMITING OF PREGNANCY.

Bicarbonate of sodium, carbonic acid, oxalate of cerium, champagne, cracked ice, tincture of iodine, columbo, carbolic acid (gr. viij. in ℥ v. of water, a tablespoonful three times a day), creasote, Fowler's solution, chloroform, podophyllin, nux vomica, bitter-almond water, bromide of potassium. Menthol, gr. xv. in alcohol ʒ v. and water ℥ v., a tablespoonful every hour until the vomiting becomes less frequent, and then every two hours until it has ceased entirely. Or morphine may be given subcutaneously, or an enema twice a day of bromide of sodium, ʒ ss.–i., or chloral, ʒ ss., in ℥ i. mucilage.

Dilatation of the cervix with the index finger; application of nitrate of silver in stick to the os. One of the milder iron preparations.

DILATATION OF THE STOMACH.

Easily digestible and rather dry food in small quantities. Pancreatin (see also Chronic Gastritis). Methodical washing out of the stomach. Cathartics (pills or Carlsbad salts). Hydrochloric acid; nux vomica. An abdominal supporter should be worn, and the constant or induced current may be applied.

CARDIALGIA, GASTRODYNIA, NEURALGIA OF THE STOMACH.

When the stomach contains some indigestible substance it is well to wash out the organ, or to give an emetic; then laxatives and emollients. Warm baths, mustard plasters; inhalations of chloroform or of nitrite of amyl; hypodermic injections of morphine; bismuth, atropine, ether, chloral, arsenic, nux vomica, nitrate of silver, acetate of lead, iodoform, oxalate of cerium.

During the attack, valerianate of bismuth (gr. iv.–viij.) with morphine (gr. $\frac{1}{12}$ to $\frac{1}{4}$); tincture of nux vomica with tincture of castor (each 12 drops); valerianate of zinc (gr. i.–ij. three or four times a day); a few drops of chloroform on sugar; morphine subcutaneously. In mild attacks trifolium fibrinum, ℥ ss., and senna, ℥ iss., of which a tablespoonful may

be added to a glass of water to make a tea. When necessary, rhubarb in combination with a bitter may be given as a laxative. The stomach should be washed out every morning, and electricity may be used. The feet and abdomen should be kept warm. For the after-treatment sea baths are useful.

ULCER OF THE STOMACH.

Liquid diet, Leube's meat solution, milk and starchy food. Beware of acids, sugar, fats, leguminous vegetables, fruit, cabbage, oat-meal, black bread, or solid food of any kind.

Leube's two weeks' cure is as follows: The patient being kept in bed, hot poultices are applied over the stomach during the day, and Priessnitz compresses at night; or ice if hemorrhage is present. In the beginning Carlsbad salt is given each morning, and for nourishment, one box a day of the meat solution, a little milk, and some softened toast—all taken warm but not hot. After two or three weeks, pigeon, chicken, purée of potatoes, thick soups, etc., and gradually a return to ordinary diet (*conf.* Caro).

For the pain, morphine with or without bismuth, choral hydrate. When much acidity is present the following will be useful:

℞ Morphinæ, ... gr. i.
Bismuthi salicyl., ... ʒ ss.
Sodii bicarb., ... gr. xl.
Sacch. lactis, ... ʒ i.

M. et div. in chart. No. 10. S. One powder two or three times a day.

For the vomiting, morphine, broken ice, creasote (gtt. i. in ℥ iij. water), tincture of iodine (gtt. ij. in ℥ iss. of sweetened water); a mustard plaster over the stomach, warm baths.

For vomiting of blood, cracked ice in the mouth and ice applied over the stomach; opium and acetate of lead, each gr. ss. every three hours; solution of the chloride of iron, tannic acid, sulphuric acid; injections of ergotin. The patient should lie perfectly quiet on the back, and should receive all nourishment by the rectum. After one or two days alum whey, oat-meal water, or meat broth may be taken cold, sweet milk or buttermilk, also cold, being added gradually. No

laxatives should be given. After the hemorrhage has ceased, Carlsbad Mühlbrunn water, extract of opium, or nitrate of silver may be given to promote cicatrization.

CARCINOMA OF THE STOMACH.

When the diagnosis is uncertain, the treatment should be that for ulcer of the stomach. Liquid diet, meat solution, and if necessary, nutrient enemata. In these cases and in others in which nourishment by the ordinary way is impossible, the meat-pancreas enemata, after Leube's formula, are often of great value: The pancreas of a pig or beef is carefully cleared of fat, and then an ounce and a half is finely chopped; from five to ten ounces of beef is also scraped and chopped fine; the two are then mixed together in a mortar into a porridge with three to five ounces of tepid water, and this is thrown as high up into the bowel as possible by means of an injection syringe with a moderately wide nozzle. An hour before the injection is used the bowel should be cleaned out by an enema. It is well to add a little salt and carbonate of sodium to the injection.

The following mixtures are also recommended for use as nutrient enemas: From three to five eggs are beaten up with five ounces of a fifteen to twenty per cent solution of grape sugar, and thrown up into the bowel. Or two to three eggs are beaten up with a tablespoonful of water; as much starch as can be taken on the point of a knife is boiled in a half glassful of twenty-per-cent grape-sugar solution, and a wineglassful of red wine added; then the egg is gradually stirred in, care being taken that the starch water is not so hot as to coagulate the albumen; the entire quantity should be about eight ounces, and to this may be added a teaspoonful of meat or milk peptone. Then, the rectum having been previously washed out, the preparation is passed into the bowel, the patient lying for a time quietly on the abdomen or side to prevent its expulsion.

In addition to these nutrient enemata tonics (red wine) should be given; also alkaline carbonates, creasote, nitrate of silver, narcotics, or condurango. (See also Leube's Diet List above, under Chronic Gastritis.) Cold applications may be made, and in addition, if stenosis at the cardiac orifice is

beginning, dilatation should be made with the sound. As laxatives, aloes, colocynth, or castor oil may be employed.

Diseases of the Intestines.

INTESTINAL CATARRH, ENTERITIS.

1. Acute Intestinal Catarrh.

First abstinence from food, then easily absorbable albuminous substances, milk, yolk of egg, meat solutions, but especially barley water, meat broths, and a little red wine. The irritating intestinal contents should be gotten rid of by castor-oil emulsion, calomel, or enemata, even when diarrhœa is present.

The patient should remain in the warm bed, and poultices or Priessnitz compresses should be applied. If a cold has been taken, diaphoresis should be promoted.

The medicinal treatment consists in the use of laudanum 10 drops repeated), astringents (by enema in catarrh of the large intestine), tannate of sodium, bela indica, carbonate or salicylate of bismuth; ipecac, nux vomica, cotoin; mucilaginous bitters and carminatives, stimulants; naphthalin.

In the case of nursing infants the greatest regularity in putting to the breast should be practised—every two hours during the day and every three hours at night—and shortly before nursing a little magnesia or bicarbonate of sodium with oil-sugar of fennel should be given. Starch enemas are useful. If necessary one of the following may be given:

℞ Mist. sulphuricæ acidæ, (Acid. sulphuric., 1 part; alcohol., 3 parts), . . . gtt. v.
Syr. papaveris, ... ℥ ss.
Decocti salep. (salep., gr. viij.), . . ℥ iiss.
M. S. Teaspoonful doses.

℞ Hydrarg. chlor. mitis, ... gr. i.
Magnesiæ, ... gr. iij.
Pulv. ipecac. et opii, ... gr. i.
Sacch. lactis, ... ʒ i.
M. et div. in chart. No. 10. S. One powder every two hours.

In the case of hand-fed infants, cows' milk should be dis-

continued and a wet-nurse procured if possible; the child should be wrapped up in cold wet cloths.

℞ Hydrarg. chlor. mitis, ... gr. i.
Pulv. ipecac. et opii, ... gr. iss.
Sacch. lactis, ... ʒ i.
M. et div. in chart. No. 10. S. One powder every two hours.

℞ Argenti nitratis, ... gr. i.
Aquæ destill., ... ℥ iiss.
M. S. A dessertspoonful every two hours.

℞ Ferri sulphatis, ... gr. iv.
Ætheris, ... gtt. ij.
Syr. papaveris, ... ℥ ss.
Mucil. acaciæ, ... ℥ iss.
M. S. A dessertspoonful every hour when vomiting is severe.

For somewhat older children one or more of the following, according to the circumstances of the case, may be given: salep, gum acacia, catechu, hæmatoxylon, tincture of coto, cotoin, rhatany, tannic acid, columbo, salicylate of bismuth, acetate of lead, solution of chloride of iron, naphthalin, antacids, or opium (with care by enema); or a dessertsponful every two hours of a mixture of 5 drops of hydrochloric acid in an ounce and a half of water. For nourishment may be given oatmeal, grits, or farina porridge, acorn-coffee or acorn-cacao, dried figs, dried bilberries and bilberry wine, and a little red wine in water. Ice-water may be given for vomiting.

2. Chronic Intestinal Catarrh.

In adults, to arrest the abnormal discharges, opium (2 grains of Dover's powder every three hours) may be given; or nitrate of silver (gr. ⅓ in pill); catechu (ʒ ss. in ℥ iv. decoction of althæa, a tablespoonful every two hours); and alum whey. At night the abdomen may be enveloped in cold wet cloths. Warm baths. Carlsbad Mühlbrunn, or Kissingen water. A carefully regulated diet.

For the paralytic condition of the intestinal muscles, small enemas of ice-water, rubbing the abdomen with camphorated oil, compound spirit of angelica, and the like; and tincture of

nux vomica (♏ iv.) with bicarbonate of sodium (gr. ij.) every two hours.

In the case of children, mercury with chalk, Dover's powder, columbo, or catechu may be given; or starch enemas with a couple of drops of laudanum or a little alum. The abdomen may be rubbed with oil or with balsam of nutmeg, and warm poultices may be applied.

When mucous or watery stools alternate with normal movements, half a teaspoonful of tincture of rhubarb may be given from one to three times a day. For anæmic children, small doses of quinine and Dover's powder. For prolapse of the rectum, nux vomica (gr. ¼ to ½) two or three times a day, and enemas of ice-water or red wine.

3. Follicular Enteritis of Infants. Tabes Mesenterica.

Substitution of a wet-nurse for bottle-feeding, without which success is to be obtained only in exceptional cases and with the most scrupulous attention to the diet. Scraped raw meat, sprinkled with sugar and moistened with Tokay wine, is often of great service. The yolk of one egg, beaten up with 3 ounces of water and a drachm and a half of milk sugar, forms a mixture in which protein, fat, sugar of milk, and water are present in almost the same proportions as in human milk. For a child of four months a teaspoonful of cow's milk may be added to this egg emulsion, and the quantity gradually increased until it amounts to about one-third of the whole amount; the deficiency of potassium salts in the egg may be supplied by a little potassium carbonate (or meat extract ?). Demme's food (to be used when fat cannot be borne) is made of one-half the white of an egg, four ounces of water, four teaspoonfuls of milk and two teaspoonfuls of sugar of milk. For other so-called substitutes for mother's milk, see Lac, Amylacea; *conf.* also Calcii Carbonas and Phosphas, Liquor Calcis, Pepsin.

4. Phlegmonous and Diptheritic Enteritis.

When there is an accumulation of fecal matter, a dose of castor oil should first be given, then opium and astringents, enemas containing nitrate of silver solution; when the inflammatory symptoms are severe, leeches are to be applied, and ice compresses. The diet must be carefully attended to.

COLIC.

The treatment is symptomatic. For severe and long-continued pain, large doses of opium are required. Warm cloths or poultices over the abdomen, which may also be rubbed with rum or volatile liniment. Bitter-almond water, carminatives, especially peppermint, valerian; warm enemas. When the colic is due to a "cold," a protracted bath in water at about 100° F. should be taken and followed by packing with warm moist cloths, to provoke diaphoresis. If the colic is thought to be due to the presence of irritating substances in the intestinal canal, mild laxatives, especially castor oil (a tablespoonful or more for adults), and copious injections; the diet should be liquid, and nothing at all should be taken during the continuance of the attack.

LEAD COLIC.

Warm-water injections thrown well up into the bowel; hypodermic injections of morphine; poultices containing narcotics; friction over the abdomen with oil of poppy and chloroform; warm baths; opium, belladonna, chloral, chloroform internally or 10 drops by enema, and also applied to the abdomen. For obstinate constipation, cathartics must be given: podophyllin, an ounce and a half of castor oil with 2 drops of croton oil, or compound infusion of senna.

HABITUAL CONSTIPATION.

Removal of the causes. Slight changes in the mode of life (variation in the breakfast), exercise, a glass of acidulated water taken fasting, etc.

Cold rubbing for a brief period and douching of the abdomen and lumbar spine, also the Scotch douche consisting of alternate warm and cold showers; cold enemas thrown well up, and methodical water-drinking; faradization of the rectum and abdominal walls; massage; gymnastic exercises.

When laxatives are necessary, manna or tamarind is the best for mild cases; when there is a weakened condition of the intestinal walls, rhubarb, cascara sagrada, rhamnus purshiana, or podophyllin may be given; in irritable states, calomel or castor oil; when it is desired to produce copious watery

stools, Epsom or Glauber's salt, with, if need be, senna; when there is an accumulation of fæces in the large intestine, aloes, white agaric, or gamboge may be given, or croton oil when the accumulation is in the small intestine. Croton oil should, however, never be used when any signs of inflammatory action are present. Various mineral waters are also of service in habitual constipation.

In peripheral paralytic conditions, nux vomica and enemata of cold water are indicated.

DIARRHŒA.

See Intestinal Catarrh.

TYMPANITES, METEORISM.

Laxatives with carminatives, or magnesia, ether, myrrh, nux vomica, antispasmodics, iron, tobacco clysters, warm and aromatic compresses, oil of turpentine. In peritonitis, typhoid fever, and puerperal fever, ice-water compresses should be applied to the abdomen and broken ice taken by the mouth. In the most severe cases, puncture with an exploratory trocar may be necessary.

INTESTINAL HEMORRHAGE.

The treatment is symptomatic as in hemorrhage from the stomach, abstinence from food, the use of opium internally, ice or a large mustard plaster over the abdomen, ice-water enemas; solution of chloride of iron, acetate of lead with opium, ergotin hypodermically, and, if necessary, restoratives.

TYPHILITIS, PERITYPHLITIS, CIRCUMSCRIBED PERITONITIS.

A differential diagnosis of these conditions is often difficult to make.

In simple typhilitis stercoralis without actual inflammatory symptoms, but with an accumulation of hard fecal masses in the cæcum, injections by means of an enema syringe, or, better, Hegar's intestinal irrigation, should be resorted to; in exceptional cases castor oil or calomel may be given. In the inflammatory forms, the application of cold compresses or light ice-bags may be conjoined with local bleeding (ten or

fifteen leeches) and the use of opium. The cold should be continued only as long as the increasing dulness on percussion, fever, and pain indicate that the local inflammatory process and the exudation are still present in high degree or increasing. When the inflammation has subsided and only the results of the process remain, poultices or hot-water compresses, warm baths, and opening of the abscess, if present, are indicated. The diet must be the lightest possible, only a little weak broth in spoonful doses, and absolute rest should be enjoined. In very severe and rapidly acute cases, surgical interference (extirpation of the vermiform appendix, etc.) will probably be called for.

PROCTITIS AND PERIPROCTITIS.

Local treatment by cold, or in certain cases warm, mucilaginous and astringent enemas, leeches, sitz-baths, narcotic suppositories, and ointments. If fluctuation appears, then poultices, incision, and other surgical measures are indicated.

PROLAPSE OF THE RECTUM.

The correction of diarrhœa or constipation; enemas of ice-water or red wine; cold sitz-baths; local application of boro-vaselin; longitudinal streaks along the mucous membrane of the prolapsed portion by means of the solid stick of nitrate of silver; nux vomica internally; ergotin subcutaneously; and faradization.

Reposition is to be accomplished by means of the two index fingers or thumbs, covered with a not too small well-greased rag.

FISSURE OF THE ANUS.

Mild laxatives so that the stools may be soft but not watery; narcotic ointments; iodoform; nitrate of silver. Or several times a day, especially after defecation, the following ointment may be applied to the part, being kept in place by a wad of cotton retained between the nates:

℞ Cocainæ hydrochlor., ... gr. viij.
Acidi borici, ... ʒ ss.
Lanolini, ... ℥ ss.
M. et ft. unguentum. S. For external use.

Suppositories of salicylic or boric acid and opium in cacao butter may also be used. Sometimes a cure is obtained only by cauterization or the division of the sphincter by means of a Paquelin apparatus.

HEMORRHOIDS.

Change of the mode of life, non-irritating diet, avoidance of alcoholic liquors, active bodily exercise stimulating respiration, cold baths and sponging, cold-water enemas, reposition of the marginal and strangulated nodules, lead water when excoriations are present, opium, and leeches to the anus to relieve the tenesmus. Cathartics may be necessary (see Habitual Constipation), but aloes and colocynth must be given only when there is very obstinate constipation; the best laxatives for the purpose are the hemorrhoidal powder (washed sulphur and potassium tartrate), compound licorice powder (a teaspoonful several times a day), podophyllin, frangula, and Kissingen, Carlsbad, Marienbad, and other laxative mineral waters.

Only in case of very profuse bleeding should cold compresses and sitz-baths, or ice-water or alum clysters, be used. The ruptured veins may be painted with solution of chloride of iron, or pressure may be made by means of compresses. Internally witch hazel is recommended. Ligation or cauterization of the larger hemorrhoidal tumors may be necessary.

INTUSSUSCEPTION—VOLVULUS. ILEUS.

In very severe cases the treatment should begin with large doses of opium, and the swallowing of cracked ice. Afterward calomel, castor oil, croton oil, and then repeated intestinal irrigation. In case of invagination, ergotin should be given, and in the beginning reposition may be attempted by a sponge-tipped sound, or by the hand introduced during anæsthesia, or by alternating injections of water and air; less advisable is the injection of carbonic-acid gas. Faradization may be used, one pole being applied to the anus and the other to the abdomen. Metallic mercury has been used. Puncture by means of a fine aseptic trocar may be practised. These measures must not be continued too long, to the prejudice of early laparatomy.

INCARCERATED HERNIA.

Reposition is often possible when the fecal contents of the intestinal loop can be squeezed back through the abdominal ring by means of the thumb and fore-finger. Gentle pulling on the hernial sac is sometimes of service. The resistance of the abdominal ring may be lessened by protracted warm baths, anæsthesia, hypodermic injections of morphine, local applications of ether, poultices containing belladonna or hyoscyamus, or ice-bags, and chloral internally. The use of strong coffee or of a grain of caffeine every half-hour often facilitates reposition, probably by exciting active peristalsis; nux vomica also acts in the same way.

Taxis should never be done roughly nor be too long continued. It is much better to resort early to herniotomy, antiseptic precautions being taken.

HELMINTHIASIS (INTESTINAL PARASITES).

Ascaris Lumbricoides (Round Worm).

Santonica (or santonin) is the proper remedy.

℞ Santonini, ... gr. v.
Hydrarg. chlor. mitis, ... gr. iij.
Pulv. rhei, ... gr. xl.
Sacch. albi, ... ʒ iss.
M. et div. in chart. No. 10. S. One powder three times a day.

Oxyuris Vermicularis (Thread or Seat Worms).

Enemas of cold water or vinegar, followed with oil; or, better, sublimate solution (1:1,000). Blue ointment may be applied to the anus and rectal mucous membrane. Decoction of garlic may be given internally and by enema.

Trichocephalus Dispar (Whipworm).

Laxatives with anthelmintics. Intestinal irrigations.

Tænia Solium and Mediocanellata. Bothriocephalus Latus.

The first is derived from the pig, the second from horned cattle, and the third probably from fish.

Male fern, especially the freshly prepared ethereal extract

in capsules, about ʒ ij. being taken in divided doses at short intervals, fasting; followed by one or two tablespoonfuls of castor oil. Pelletierine, pomegranate bark, kousso, kamala, benzin, picro-nitrate of potassium (gr. ij.–ix. two or three times a day in pill form), dog-rose, turpentine, oxide of copper, and chloroform. The following method of treatment is also recommended: For several days the patient takes any one of the salts of quinine, 1 grain each night, and at the end of that time a full dose of castor oil; then for three days a pill every hour of ½ grain of carbolic acid with powdered licorice (look out for toxic symptoms), and morning and evening a laxative of rhubarb and jalap; finally a paste made of 500 or 600 pumpkin seeds with sugar and water is taken in the morning in teaspoonful doses, washed down with copious draughts of water, and at noon a dose of castor oil. Care must be taken, while the worm is passing, to prevent its breaking. The patient should sit over a vessel containing warm water, and it is well to assist the passage with a high injection of about two quarts of water.

ANCHYLOSTOMUM DUODENALE (GOTTHARD WORM).

Is met with chiefly among the brick and tile workers of Italy, the Rhine provinces, and other places, in brick-makers' anæmia.

The remedy is extract of male fern in large doses.

Diseases of the Peritoneum.

PERITONITIS.

In mild cases, absolute rest, a low diet, warm poultices, and Dover's powder are often sufficient. In more severe cases, fifteen to thirty leeches may be applied, and then opium. Cold is to be applied at first, as long as it produces comfort, and broken ice given internally, and after a few days moist heat. Mercurial ointment may be used. After five or six days, the bowels may be moved by means of simple enemas, castor oil, or calomel, especially in case of fecal accumulation. For the tympanites, ice-water compresses; giving vent to the gas by the introduction of a rectal tube; internally calcined magnesia, carbonate of potassium or sodium, and lime water; and in extreme cases puncture of the distended intestine with

a fine trocar. After the inflammatory symptoms have subsided, resolvents may be used.

For singultus, repeated small doses of chloral or extract of hyoscyamus are useful. Collapse calls for stimulants and irritant applications.

In puerperal peritonitis, calomel is indicated at first.

Chronic peritonitis is to be treated by moist heat externally, warm baths, opium (in certain cases), cod-liver oil, iodide of iron, resolvents; acetate of ammonium or of potassium, borotartrate of potassium and sodium, digitalis, squill, etc. (*conf.* Perityphiltis, Perimetritis, Puerperal Fever.)

For the pain which remains after the disease has subsided, warm baths and painting the abdomen with tincture of iodine are of service.

ABDOMINAL DROPSY, ASCITES.

Treatment of the causal disease: peritonitis, diseases of the heart, lungs, blood-vessels, liver, and kidneys, circulatory disturbances, new growths, cachexiæ, etc.

For the ascites itself, dependent or not upon any discoverable cause, of the first importance are diuretics, especially calomel (gr. iij.) with opium (gr. $\frac{1}{6}$) three times a day for three or four days; if no result is obtained, this course may be repeated in a week; and if still unsuccessful, it had better be abandoned. Species (see Part II.) of juniper, parsley, and fennel may be tried, or Wildungen, Assmannshausen, Brückenau, or other natural diuretic waters.

If diuretics are of no avail, and there is no gastric or intestinal catarrh, drastics should be given. At the same time, especially if general œdema is present, vapor baths, alcoholic vapor baths, hot sand baths, fumigation with juniper berries, warm bran baths, enveloping the body in cotton, etc., may be resorted to. Finally, puncture may be necessary for the evacuation of the fluid.

Diseases of the Liver, Bile Ducts, and Portal Vein.

CONGESTION OF THE LIVER (ACTIVE OR PASSIVE).

The etiological factors which call for treatment are the abuse of alcohol, plethora, a sedentary life, heart and lung diseases, amenorrhœa, constipation, and hemorrhoids.

The symptomatic treatment consists in local abstraction of blood over the region of the liver or at the anus, warm applications, blisters, saline laxatives. Carlsbad (except in cardiac or pulmonary affections), Friedrichshall, Marienbad, and other similar waters; aloes, rhubarb, rhamnus purshiana, etc.

HEPATITIS.

1. Interstitial Hepatitis, or Cirrhosis of the Liver.

The most frequent cause is the inordinate use of spirituous liquors, but also of wine or beer; further, though seldom, malaria, gall-stones, and syphilis.

The treatment, in addition to careful regulation of the diet, is in the beginning that of congestion of the liver—Carlsbad or, in debilitated persons, Franzensbad or Kissingen water; also the iodine waters, such as Kreuznach; nitric acid; and, in syphilis, iodine or iodide of iron.

Later, symptomatic treatment and tonics, but not alcoholics. When ascites is present in sufficient amount to cause dyspnœa, the fluid must be removed by puncture.

2. Syphilitic Hepatitis and Perihepatitis.

If the condition is recognized in its early stages, success may be looked for from the iodine treatment.

3. Suppurative Traumatic and Metastatic Hepatitis.

In the case of traumatism, antiphlogistics are first called for. Warm poultices containing narcotics, mild laxatives. When chills are present, quinine is indicated; and when an abscess is detected, it must be opened.

4. Diffuse Parenchymatous Hepatitis. Acute Yellow Atrophy of the Liver.

The treatment is purely symptomatic. In the stage of exudation, antiphlogistic measures and mild laxatives; in that of atrophy, the individual symptoms are to be met by their appropriate remedies.

The other diseases of the liver, as well as inflammation of the portal vein, furnish no particular indications and are to be treated on general principles.

Catarrhal Jaundice. Icterus Gastro-Duodenalis.

Strict attention to the diet, indigestible and fatty foods being avoided. When diarrhœa is not present, mild laxatives (bitter water, compound infusion of senna) are called for; and when diarrhœa exists, small doses of calomel with bicarbonate of sodium. Warm baths are of service, especially for the itching of the skin. When there is pain in the liver a few leeches may be applied. In recent, acute cases emetics are also of service.

If the jaundice still persists at the end of two weeks, stronger cathartics are called for, such as calomel with rhubarb, aloes, podophyllin, rhamnus, senna, or three or four wineglassfuls daily, fasting, of warm Carlsbad Mühlbrunn water, or of Kissingen, Neuhaus, etc.

When no cause can be discovered, then foot-baths with 2 ounces of nitrohydrochloric acid to the bath may be taken; diuretics (lemon juice, ℥ iss.–ij. a day), especially when diarrhœa is present. In addition drastics may be given, or irrigations of the bowel with one to two quarts of warm water (66° to 72° F.) repeated until the stools begin to be again colored with bile.

For the itching of the skin, lotions of diluted vinegar may be used, rubbing with slices of lemon, chloral (three to five per cent solution), and baths.

Cholelithiasis and Hepatic Colic.

Carlsbad, Marienbad, and Vichy waters; ether and oil of turpentine, the well known, but not especially to be recommended, Durand's remedy: 20 to 30 drops several times a day in meat broth, of a mixture of 5 parts of turpentine in 20 of ether, continued until about 8 ounces of the remedy has been taken; podophyllin. Salicylic acid may be taken in doses of gr. xv. dissolved in a pint of hot water three times a day, and in addition a high rectal injection twice a day of ℥ i. of the acid in a quart of tepid water. Olive oil is highly recommended in doses of ℥ iij.–vi., taken at once or in four doses at intervals of one hour, and repeated in a few days; or it may be given in the following form:

℞ Mentholi, ... gr. viij.
Spir. vini gall., ... ʒ v.
Vitell. ovi, ... No. ij.
Ol. olivæ, ... ℥ vi.

M. bene. S. Take in four to eight portions during the course of two or three hours.

Opium in large doses (up to 40 drops of the tincture, repeated in smaller amount), morphine (gr. ⅓ to ½ hypodermically), chloroform, chloral, belladonna. For collapse, ether or camphorated oil may be injected subcutaneously.

Other remedies are, leeches, narcotic poultices, chloroform stupes on the abdomen, and protracted hot baths.

Diseases of the Spleen.

HYPERTROPHY OF THE SPLEEN.

For the treatment of hypertrophy resulting from intermittent fever (ague-cake), see under this disease.

When it is due to chlorosis, iron and quinine are indicated; when due to anæmia, quinine with pentasulphide of antimony, or iodide of iron; when due to syphilis, mercurials.

III. DISEASES OF THE ORGANS OF CIRCULATION.

Diseases of the Heart.

PERICARDITIS.

Antiphlogosis, ice, if necessary abstraction of blood. When pain is severe, morphine; in palpitation of the heart (but not when the pulse is small and irregular, when paralysis of the heart threatens, or in adynamic conditions) digitalis in large doses, but when the heart is weak, in small doses with nitrate of potassium or acids; tincture of strophanthus, convallaria majalis, sparteine, with caution. Calomel, blue ointment, later resolvents, diuretics, especially acetate of potassium (with digitalis), diaphoretics, laxatives, Priessnitz compresses, tincture of iodine. For the relief of the dyspnœa, Dover's powder, morphine, ice-bags; of singultus, cracked ice, chloral hydrate.

ENDOCARDITIS.

As a prophylactic measure in rheumatism, subcutaneous injections of carbolic acid, and salicylate of sodium internally (?).

Digitalis in moderate doses alternating with quinine; convallarin, sparteine; ice-bags over the heart, but no bleeding. Absolute bodily and mental quiet; the avoidance of all stimulating beverages, etc. For the strong a restricted, and for the weak a strengthening, diet. In collapse, stimulants, coffee, wine, camphors, etc.

VALVULAR LESIONS.

The treatment must be more especially hygienic and symptomatic according to the general principles of promoting and maintaining compensation, and moderating over-compensation.

All exciting factors should be avoided, the patient should drink only mild beer, should seek fresh air, indulge in moderate exercise, and take good care of the skin.

Drugs that may be necessary are: Digitalis, strophanthus, convallaria, sparteine, and tonics, iron and quinine.

Symptomatic Treatment.—Bitters, rhubarb, mildly laxative saline mineral waters (Homburg, Kissingen, Soden).

In the case of ascites or anasarca, diuretics, acetate of potassium, squill, digitalis, and in certain cases drastics. Bandaging the legs and keeping them elevated may be of service in reducing the œdema.

In case of aortic insufficiency with over-compensation, digitalis in large doses, or strophanthus, may be given. In severe paroxysms, morphine injections will be required, with ice-bags to the chest.

The breathing of compressed air is useful in passive congestions, and in mitral affections with insufficient compensation.

HYPERTROPHY OF THE HEART.

The treatment is symptomatic: Cold, digitalis or strophanthus.

PALPITATION OF THE HEART.

Etiological Factors.—Organic diseases of the heart, anæmia, dyspepsia; psychic affections, hypochondriasis, hysteria, sexual disorders, chlorosis, excesses in venery or in

studies; abuse of tobacco, tea, or coffee; plethora; tumors along the course of the nerves in the neck or in the thorax.

Treatment.— Cold applications, ice internally; sitting in a bent position; nervines, valerian, castor, quinine when the attacks recur with regularity. Fowler's solution (3 drops several times a day); digitalis in large doses, convallaria; narcotics, morphine hypodermically, chloral, bromide of sodium; wine for anæmic patients.

Diseases of the Blood-Vessels.

ANEURISM.

Keep up the strength, avoid plethora and increased heart's action.

Compression, Esmarch's bandage, etc.; ergotin, perfect quiet, low diet; narcotics; cold externally applied. Digitalis is contra-indicated, because it increases intra-arterial pressure.

Electrolysis. Strong, but careful, flexion for several hours at a time of the joint above the aneurism when it is seated in one of the extremities (?).

TELANGIECTASIS, VASCULAR NÆVUS.

Children may be vaccinated on a small nerve, or suppuration may be established at the place by means of a tartar emetic plaster (1 to 3), corrosive collodion, or fuming nitric acid; the galvano-cautery; excision; cauterization with a pointed Paquelin cautery at several sittings. In the case of pedunculated growths the elastic ligature may be used.

Electro-puncture.

VARICOSE VEINS.

Compression by elastic or other bandages, laced stockings, adhesive plaster, starch bandage. Depletion of the vessels by means of saline laxatives and low diet. Vidal's operation. Injections of ergotin and alcohol.

IV. DISEASES OF THE NERVOUS SYSTEM.

Diseases of the Brain and Meninges.

ANÆMIA OF THE BRAIN.

Causes.—General, and especially acute, anæmia, hemorrhage, shock (the massing together of large quantities of blood

in the mesenteric vessels, etc., in consequence of reflex vasomotor paralysis, especially of the splanchnic), insufficient action of the heart, inanition, protracted diarrhœa in childhood.

Treatment.—Stimulants and tonics, ammonia salts, musk, wine. In infants, a return to breast-milk, if bottle-fed, and a few drops of Tokay wine several times a day; in older children, yolk of egg, scraped raw meat, pomated tincture of iron, cod-liver oil. The horizontal position should be maintained. For the delirium of inanition opium should be given.

SEASICKNESS.

Anæmia of the brain with consecutive functional disturbances in the parts supplied by the vagus nerve.

Prophylaxis.—Remaining on deck in the middle of the ship, if necessary in the horizontal position; the carrying out of opposed movements with closed eyes; a hearty meal taken before going on board, and while on ship nourishment in small quantities taken at frequent short intervals; champagne; aromatic bitters; chloral, antipyrine, cocaine.

To relieve the nausea and vomiting: Creasote, lemon juice, Haller's acid elixir, carbonic acid, chloroform in five drop doses several times a day, chloral, quinine in large doses; inhalations of nitrite of amyl; counter-irritation to the gastric region, cold compresses to the forehead and back of the neck; stimulating odors; morphine subcutaneously; and keeping the bowels open.

HYPERÆMIA OF THE BRAIN.

Removal of the causes as far as possible.

General and local bleeding; ice bags, cold douches; drastic cathartics (calomel with jalap), derivatives, irritant enemas; avoidance of stimulants. (Leeches to the cervix uteri and to the anus). Active bodily exercises. Saline mineral waters, Friedrichshall, Kissingen, Marienbad, etc., and if necessary stronger cathartics, such as aloes, etc.

SUNSTROKE, HEATSTROKE.

Removal of the patient into the shade or a cool chamber; absolute quiet; cool water in gradually increasing amounts, cold douching every hour, applications of ice bags; leeches

behind the ears (beware of venesection); sinapisms; calomel and jalap; subcutaneous injections of quinine.

CEREBRAL AND MENINGEAL HEMORRHAGE (APOPLEXY).

Prophylaxis.—The reduction of any existent hyperæmia of the brain and removal of its causes.

Treatment during the Hemorrhage.—Small venesection in cases of marked hyperæmia and at least normally full radial pulse; raising the head; mustard to the extremities, and ice to the head. When, however, the respiration is hesitating and the heart's action weak, a stimulant treatment is indicated; irritation of the skin, musk, ammonia salts, wine; ether and camphor subcutaneously; irritating enemas.

When hyperæmia is not marked, but inflammatory symptoms are present, drastic purgatives, cold cloths to the head, leeches to the mastoid process or to the nasal septum, and dry cups to the nucha, are called for.

When symptoms of pulmonary hyperæmia are present together with severe cough, digitalis with tartar emetic may be given, and dry cups applied.

Treatment of the Stage of Reaction (fever, headache, encephalitis).—Cold applications, in severe cases leeches; laxatives; chloral, opiates. For the subsequent weakness and anæmia: arnica, iron, quinine.

Treatment of Hemiplegia (only after three to five months).—Electricity, tepid baths. Stimulating spirituous and other liniments cannot be avoided in ordinary practice. Various spas are resorted to for bathing purposes.

MENINGITIS SIMPLEX (LEPTOMENINGITIS), PACHYMENINGITIS.

Energetic antiphlogistic treatment is necessary, such as leeches to the mastoid processes, cups to the nucha, ice to the shaved head and in compresses or in a narrow bag along the vertebral column. Laxatives, calomel; mercurial ointment; seldom quinine.

In persistent excitement and severe pain, in spite of the antiphlogistic treatment, opium must be given, especially small hypodermics of morphine in the back of the neck; ether dropped or sprayed on the head. Chloroform liniment.

Chloral, bromide of sodium. In case of collapse, stimulants; later, resolvents (warm baths, iodine). Derivatives. Cold douching should only be practised in the paralytic stage.

TUBERCULAR BASILAR MENINGITIS (ACUTE HYDROCEPHALUS).

See Infectious Diseases.

CONGENITAL OR CHRONIC HYDROCEPHALUS.

Good nourishing food (milk, broths, wine) with iron and baths, and occasionally a diuretic or cathartic (calomel, if necessary with digitalis); iodide of potassium; the application of tincture of iodine to the head; flying blisters.

ENCEPHALITIS (INFLAMMATORY SOFTENING OF THE BRAIN).

Local antiphlogistic remedies and laxatives are indicated in strong individuals when inflammatory symptoms are present, also later when signs of irritation are evident, headache, irritable pulse, etc.

In encephalitis following otitis, poultices should be applied to the ear to bring back the discharge.

In symptoms of depression and paralyses, tolerably active intestinal derivation and a nourishing diet are called for. For the nervous excitement, morphine or bromide of sodium.

Diseases of the Spinal Cord and its Envelopes.

Of the numerous diseases belonging to this category the following may be more particularly referred to.

ACUTE MYELITIS.

The early stages demand absolute quiet and antiphlogistic measures, such as local blood-letting, Chapman's ice bags, Priessnitz compresses renewed every hour or two; mercurial ointment, blisters along the spinal column, tincture of iodine, and in severe cases the actual cautery. Iodide of potassium internally, and in appropriate cases ergot, belladonna, laxatives, and diuretics.

For the paralysis, electricity, tepid baths, and in the later stages mineral water baths at Teplitz, Warmbrunn, etc.

CHRONIC MYELITIS.

Thermal baths (Teplitz, Nauheim, etc.), cold-water treatment, galvanism; in certain cases, ergot and nitrate of silver. Care must be taken to prevent cystitis and bed-sores.

TABES DORSALIS. LOCOMOTOR ATAXIA (SCLEROSIS OF THE POSTERIOR COLUMNS).

Absolute avoidance of all venereal excesses; treatment of priapism and pollutions by camphor and lupulin. Sweating of the feet to be repressed by dusting with unslaked lime, or excited by powdered mustard in the stockings or by foot-baths. The body should be kept warm by woollen underclothing. Cold or alcoholic lotions, cold packing, river and sea baths, douches etc. (cold-water cure). When cold water is not tolerated, then a course of warm baths at one of the various thermal spas may be taken. Nourishing diet, iron, cinchona, nitrate of silver, iodide of potassium. For the lancinating pains and twitchings, antipyrine or morphine may be given. The constant current with hydrotherapy.

POLIOMYELITIS ANTERIOR ACUTA INFANTUM (INFANTILE PARALYSIS).

When the short, feverish stage of the acute inflammatory condition is recognized, it should be treated on the lines laid down for acute myelitis.

Treatment of the resulting paralysis, atrophy, contractures, and deformities should be by means of thermal, saline, and sea-water baths, galvanism, passive movements, and orthopædic apparatus.

In addition, blisters, tincture of iodine to the spine; laxatives (calomel, occasionally with jalap); iodide of potassium with hypodermic injections of strychnine, 2 drops of a one-per-cent solution; 12 to 14 drops three times a day of a mixture of equal parts of nux vomica, camphor, and pyrethrum, and at the same time frictions to the skin of equal parts of water of ammonia and tincture of nux vomica; nitroglycerin (?).

POLIOMYELITIS ANTERIOR CHRONICA (PROGRESSIVE MUSCULAR ATROPHY).

By way of prophylaxis the members of families in which the disease already prevails should guard especially against taking cold and excessive muscular strain.

The treatment consists only in active and passive movements and electricity, especially the constant current. Peripheral (local) galvanization and faradization are more serviceable than central (of the sympathetic).

GLOSSO-LABIO-PHARYNGEAL PARALYSIS.

Degeneration of the large ganglion cells in the motor ganglia of the medulla oblongata. Galvanization transversely through the mastoid processes and longitudinally through the skull; galvanization of the cervical sympathetic. Production of swallowing movements by the anode resting at the back of the neck and the cathode rapidly passed along the sides of the larynx; galvanization or faradization of the tongue, lips, and soft palate.

For excessive salivation, atropine may be given. Nutrition in the later stages must be provided for by the stomach tube and by nutrient enemas. Internally nitrate of silver may be given.

Neuroses of the Sympathetic Nerve.

HEMICRANIA, MIGRAINE (*Conf.* NEURALGIA OF THE FIFTH NERVE).

Pain coming on in attacks, affecting one side of the head, usually introduced or accompanied by vomiting, and accompanied also by vaso-motor disturbances; it lasts for hours or days, and during its continuance renders the patient unfit for any bodily or mental work. The attacks are followed by longer or shorter periods of freedom from pain, but recur at intervals often for years.

Treatment of the causal conditions consists in the removal of any constitutional defects, the institution of a suitable diet, regulation of the functions of the stomach and intestine, and proper alternation of work and rest. In aæmia, iron or a course

of chalybeate waters may be taken; in hemorrhoids, Kissingen, Carlsbad, and other waters; in a neuropathic constitution, cold frictions, cold-water treatment, sea-baths, etc.

To reduce the frequency and violence of the attacks, when anæmia is marked, arsenic is usually given empirically in doses of gr. $\frac{1}{12}$ a day; when vaso-motor disturbances are a prominent symptom, atropine should be given in daily doses of gr. $\frac{1}{60}$ for at least a month; if improvement should follow, then one or the other remedy is to be continued for a long time, if need be for years.

During the attack the first thing is for the patient to remain in bed in a darkened room and withdrawn from anything that may cause mental excitement; then the application of heat or cold, bandaging the head or leaving it free, according as one or the other gives the greater measure of relief, and irritant foot-baths. In case of very acute pain, morphine must be given subcutaneously in doses of gr. $\frac{1}{4}$ to $\frac{1}{3}$. Sometimes salicylic acid, in doses of 15 to 30 grains, is of service; caffeine, beginning with 2 grains and increasing to 15 grains if necessary; antipyrine, gr. xv. to xxx.; antifebrin, in doses of gr. iv. several times repeated; or phenacetin, in repeated doses of gr. vi. As a domestic remedy table-salt in doses of $\frac{1}{2}$ to 1 teaspoonful at the beginning of the attack, followed by a little water, is highly esteemed.

In angio-spastic hemicrania (contraction of the vessels during the attack, the affected side of the head being pale, and the pupil dilated), the inhalation of a few drops of nitrite of amyl or bisulphide of carbon is of service.

In angio-paralytic hemicrania (dilatation of the vessels, the affected side being reddened and the pupil contracted), ergotin subcutaneously or gr. viij. to xv. internally. Galvanization of the sympathetic for one or two minutes at a time, two or three times a week (positive pole at the inner border of the sterno-cleido-mastoid muscle, the negative pole over the first dorsal vertebra, with alternate closing and opening of the current) is also a palliative measure.

ANGINA PECTORIS.

Palliative Treatment.—Inhalation of ether, chloroform, nitrite of amyl; hypodermic injection of morphine; ice; derivatives; avoidance of harmful influences, of tobacco-smoking, etc.

General Treatment.—Iron, preparations of zinc, nitrate of silver, nitrite of amyl, nitrite of sodium, nitroglycerin, arsenic, bromide of potassium, digitalis, quinine; derivatives, such as mustard plasters or volatile liniment with chloroform.

The faradic brush is both palliative and curative; galvanization with the positive pole having a broad surface of contact on the sternum, and the negative over the lower part of the cervical spine; in other cases galvanization of the sympathetic and vagus is useful.

EXOPHTHALMIC GOITRE (BASEDOW'S OR GRAVES' DISEASE).

Quinine alternating with iron (carbonate); a nutritious diet; bodily and mental repose; in women the genital functions must be attended to.

Ice bags; cold-water treatment; long-continued use of the constant current (10 to 12 Daniels' cells), the electrodes being applied to the back and front of the neck; galvano-puncture of the enlarged thyroid. Internally iron and arsenic may be given when anæmia is present. From the use of iodine and digitalis there is little improvement to be hoped for.

NEURITIS.

In acute cases, antiphlogistics and narcotics; in more chronic cases the Priessnitz pack, followed by half-baths, counter-irritation (though not immediately over the diseased nerves), galvanism.

For the severe pain, tepid baths; the various anæsthetics and narcotics, especially morphine internally and hypodermically; antipyrine, phenacetin; rubbing with chloroform and olive oil, or benzin for the relief of neuralgia remaining after the subsidence of the more acute symptoms. In certain cases it may be necessary to excise a cicatrix or a portion of the nerve. If there is any ulceration of the cervix, it must be energetically treated.

For any paralysis remaining, thermal, peat, or saline baths, or an active cold-water treatment, and electricity.

NEURALGIA.

The entire mode of life must be looked into and regulated, and the constitution must be cautiously toughened.

Electricity is usually applied by means of the cathode resting upon some indifferent part and the anode on the painful points and nerve trunks. The faradic current is to be used in peripheral neuralgias where the nerves can be reached by it, the galvanic in addition in central and deep-seated neuralgias (of the nerve roots, cerebral and spinal).

Cold is applied by means of ice, ether spray, douches, sea baths, cold-water treatment, and local douches of carbonic acid; heat in natural thermal baths, vapor, hot-air, and prolonged warm sand baths.

Other remedial measures are: traction by weights (in nervous coxalgia), neurotomy, and nerve-stretching.

NEURALGIA OF THE FIFTH NERVE, TIC DOULOUREUX

(*Conf.* HEMICRANIA).

Very severe attacks of pain, excited by the slightest causes, along the course of one, seldom of all three (ophthalmic, supra- and infra-maxillary) branches of the trigeminal nerve on one side.

Internal remedies: Arsenious acid (Fowler's solution) or atropine, both in small doses at first and gradually increased; quinine, with caffeine, in large doses; oil of turpentine; salicylate of sodium (up to ʒ iss.–ʒ ss. a day); antipyrine (gr. xv.) or antifebrin (gr. iv.–viij.) a few times a day; corrosive sublimate in very small doses; also chloral, ergotin, bromide of sodium, etc.

Subcutaneously, morphine in doses of gr. $\frac{1}{8}$ gradually increased to gr. iss. and then decreased; atropine in doses of gr. $\frac{1}{120}$, cautiously increased a little.

External remedies: Veratrine, gr. xij. in lard ʒ i. with a little alcohol; mercurial ointment; cantharidal collodion along the course of the affected nerves; tincture of iodine; ether spray; morphine as a snuff; a weak constant current.

In extreme cases, ice is to be applied to the head and back of the neck; leeches (applied to the nasal septum when the pain is in the frontal sinuses); rest; fresh air.

Stretching or resection of a nerve; excision of any cicatrix compressing a nerve.

In a similar way are to be treated all the other neuralgias of the neck, trunk, etc.

SCIATICA.

Differential Diagnosis.— In rheumatism of the thigh movements of the individual muscles cause great pain; in rheumatism of the hip-joint every motion causes pain, and in addition the neighborhood of the joint is usually swollen; in coxitis the pains are especially increased by rotation and pressure of the head of the bone into the cotyloid cavity; in psoitis there is fever, the patient complains of pain above the crest of the ilium, and usually holds the thigh flexed on the abdomen.

Treatment.—The stools should be kept regular and of soft consistence by means of castor oil or a saline laxative. In recent cases relief may be obtained by cups over the sacral region and on the skin along the course of the nerve; also by sinapisms and flying blisters. Usually excellent results are obtained by a not too weak galvanic current applied in rather long séances several times a day, the anode being placed on the sacrum, the cathode along the course of the nerve.

Among the remedies empirically employed are iodide of potassium, rectified oil of turpentine in doses of ʒ ij.–iij. a day mixed with clarified honey; morphine subcutaneously; veratrine in ointment, as given above under neuralgia of the fifth nerve, or applied endermically in doses of gr. $\frac{1}{60}$—$\frac{1}{30}$. Heat locally applied; vapor and prolonged hot sand baths; Kissingen, Teplitz, etc.

PARALYSES, PARESES, ANÆSTHESIÆ.

When the nerve substance is degenerated or destroyed treatment is useless as far as concerns repair of the damage already done, yet a proper electrical and gymnastic treatment should be instituted in the endeavor to arrest the degenerative process; and in diseases of this kind arising from other causes than destruction of nervous tissue electricity is the first measure to be resorted to; in paralysis following disease of the central nervous system, galvanic electricity is the form to employ, while in peripheral paralysis, and when it is desired to stimulate the paralyzed peripheral parts, faradism should be used. In hysterical paralysis of the vocal cords, cutaneous faradization or faradization of the large nerve trunks in the neck is sufficient.

In addition to electricity, appropriate exercises, active and passive, frictions of the skin with alcohol, and strychnine internally. Various baths are also useful, such as saline, sulphur, vapor, and hot sand baths; also in special cases carbonated iron, peat, and mud baths; in strong patients sea baths and the cold-water treatment may be of service.

SPASMS, CONVULSIONS.

Enemas of chamomile tea with castor; in certain cases emetics.

Narcotics, especially morphine injected beneath the skin or into the muscles, or atropine, chloral, chloroform, bromide of sodium, nitrite of amyl, and Calabar bean.

Nervines, nearly the entire list.

Derivatives, among others warm baths with cold douches to the head, mustard plasters, and in inveterate cases the actual cautery.

Galvanism, ascending current along the nerves and muscles, or alternating current, or the stable action of the anode.

Stretching of the facial nerve is sometimes advised in mimic spasm.

Neuroses without any known Anatomical Cause.

CHOREA (ST. VITUS' DANCE).

The mode of living must be first attended to; a suitable nutritious diet and little or no alcohol; abstinence from all mental effort, no study; plenty of sleep, even during the day if the child so desires, and late rising in the morning. The protracted warm baths should be given, or better yet a daily wet pack of ½ to ¾ hour's duration. (The sheet used for the purpose should be wet in water at a temperature of about 88° F.) The child should take moderate exercise, but be much in the open air. The value of electricity is doubtful.

Medicinal Treatment.—Fowler's solution in doses of 3 to 5 drops for children, and 8 to 10 drops for adults, three times a day, slowly increased. The combined treatment by antipyrine and the bromides, after the following plan, has proved itself of value: Three times a day immediately after meals antipyrine gr. viij. with bromides gr. xv., best in the form of Erlenmeyer's bromine water (see Potassii Bromidum in Part II.); at the

end of three days the antipyrine is increased to gr. xij. three times a day, and after three days more to gr. xv., combined with ℥ iv. of the bromide solution; thus the daily amounts are 45 grains of antipyrine and 12 ounces of the bromine water (containing 75 grains of bromine salts). In addition, the body should be rubbed several times a week with soft soap, or some other bland soap, and sponged with cold water. As an after-treatment chalybeate peat baths are recommended. Various nervines, oxide of zinc, valerianate of zinc, strychnine, and inhalations of a few drops of choloroform, are also recommended.

TETANUS AND TRISMUS.

Removal of the irritating cause, incision of the nerves, morphine locally applied; the most perfect quiet, and removal of all disturbing influences. A gradually cooled bath may be given at the period of greatest fever. Spinal ice-bags, and the cold wet pack. In rheumatic tetanus, diaphoresis, vapor baths, hot diaphoretic drinks with spiritus Mindereri, and opium in large doses.

The strength must be kept up, in severe trismus by means of nutrient enemas. In trismus, intra-muscular injections of morphine are to be given.

Narcotic Remedies.—Chloral in a single evening dose of 40 grains if the temperature does not rise above 101.5° F., if it does rise another dose may be given; or chloral may be given in doses of 30 to 45 grains alternating every two hours with 15 grains of sodium bromide until sleep comes. Other remedies are: opium or morphine, Calabar bean, belladonna, nitrite of amyl, carbonate of ammonium, strychnine, curare, inhalations of chloroform, or enemas of oil of turpentine.

Scars should be excised. The room should be kept dark and perfectly quiet. In some cases early amputation of the extremity where the primary wound was received has saved the patient.

EPILEPSY.

The first thing is to attend to the diet and to regulate the mode of life; a milk and vegetable diet is the most appropriate.

Atropine may be given in initial doses of gr. $\frac{1}{120}$, gradually increased to gr. $\frac{1}{12}$, at bed time; the increase should be at the rate of gr. $\frac{1}{60}$ each week, the maximum dose continued for two

weeks, and then gradually reduced at the same rate until the initial dose is again reached. To reduce the number and violence of the attacks and eventually to cure the disease, the bromides are to be given in solution in doses of 15 grains three times a day, increased each week by 15 grains until in the eighth week the patient is taking 150 grains a day; and if the attacks have not ceased to recur, this may be increased up to the fifteenth week, when a daily dose of 225 grains will have been reached; if improvement occurs, the dose is to be gradually reduced in the same way, to be again increased if the attacks begin to recur. This treatment may be continued, under the observation of the physician (because of the possibility of bromism being produced), for years if necessary.

In addition are recommended: A teaspoonful of powdered wormwood every two days, an extra dose being given immediately upon the appearance of the aura; powdered valerian in doses of gr. viij. increased to gr. xviij. four to six times a day; nitrate of silver in solution in maximum dose of gr. iss. a day, but with care on account of the danger of argyria; ammonio-sulphate of copper in beginning doses of gr. ¼ a day, increased to the maximum of gr. iv., in pill form; Fowler's solution in daily doses of 5 to 15 drops; lactate or oxide of zinc in powder, beginning with gr. iss. a day, and rapidly increasing to gr. xxx.–xl. Opium and chloroform inhalations are not to be recommended; better is the cold-water or electrical treatment (mild current). Quinine is indicated in cases where the attacks recur with marked periodicity, and iodide of potassium in syphilitic cases. Subcutaneous injections of curare and strychnine (?), excision of cicatrices, neurotomy, and nerve-stretching have been recommended.

For cutting short the attack, a ligature around the limb whence the aura starts, or compression of one or both carotids near the cricoid cartilage may be useful. In domestic practice a handful of salt, taken at the appearance of the aura, and cold compresses are often used.

ECLAMPSIA.

1. Infantile Eclampsia.

Any exciting causes should be removed as far as possible; dentition, cerebral hyperæmia, fever; irritating ingesta, foreign bodies in the digestive tract, worms; dyspepsia or mental

disturbance of the nurse, etc. Children should be toughened by cold sponging and by being carried out into the fresh air, even when it is cold.

The gums should be lanced if necessary, or they may be rubbed with chloroform when there is irritation from dentition. Sprinkling with water sometimes cuts short the convulsion; an overloaded stomach should be emptied by an emetic; calomel may be given, or oxide of zinc (up to gr. iss. a day), or valerianate of zinc; stimulants in collapse; bromide of sodium, chloral, nervines; cold douching is safer; enemas of asafœtida, valerian, musk; or of a few drops of chloroform, bitter-almond water, tincture of opium; or of soap-suds and salt, or vinegar. Inhalations of chloroform may be given at the beginning of an attack or when the child is unable to swallow.

2. Puerperal Eclampsia (*Conf.* Uræmia).

First Indication.—Chloral hydrate by the mouth or rectum, or morphine hypodermically; inhalations of chloroform to narcosis (during which delivery may be accomplished), or also of nitrite of amyl; bromides, opiates by enema; ice to the head.

Second Indication.—Rapid delivery of the child; mustard plasters to the back of the neck; in some cases life may be saved by venesection.

In protracted cases, when uræmia is the cause of the convulsions, warm baths may be given, or the cold pack with subsequent sweating.

3. Saturnine Eclampsia.

No active antiphlogistic treatment, but rather expectant. Cold compresses, blisters; in all forms, good nutritious food, iron, beef tea, wine. (*Conf.* Lead-Poisoning.)

CATALEPSY.

During the attack, cutaneous irritation of various kinds, electricity, cold douches; chloroform by inhalation.

In the intervals, treatment of the causal condition; diaphoresis if a cold has been taken; warm water or sulphur baths; continued counter-irritation; issues, etc.

HYSTERIA.

Psychic, dietetic, and hygienic treatment; tonics; in many cases alcohol with aromatics, in doses of 1 to 5 teaspoonfuls a day, renders good service.

Suitable treatment for any affections of the sexual organs that may be present, for anæmia or chlorosis; chalybeate tonics, Roncegno water; regulation of the bowels. When psychic influences are active, muscular exercise is necessary; also cold-water treatment, enemata of cold water, sea and river baths.

The Weir-Mitchell treatment, which is highly recommended for nervous disorders of various kinds, consists in absolute rest in bed, isolation from all disturbing influences, and a great abundance of the most nourishing food. Massage and electricity are very useful later.

For the convulsive attacks, castor, asafœtida, bromide of sodium, solution of anisated ammonia, and tribromethyl are of service.

For the neuralgic pains and paralyses, electricity, cold douching, cold and spirituous frictions, and hypodermics of morphine.

For the insomnia, narcotics are to be given only in very exceptional cases, and instead of them should be used bromide of sodium, chloral, lactucarium, or a glass of beer at night.

NEURASTHENIA.

General Symptoms, often varying in individual cases: Pressure and pain in the head, hyperæsthesia of the scalp, incapacity for methodical mental work, sometimes weakness of vision, and a feeling of pressure in the eyes (neurasthenic asthenopia), and insomnia. Depression of the mind; a feeling of anxiety and a hypochondriacal frame of mind; sensations of vertigo, general bodily weakness, poor appetite, costiveness; a dry skin and sluggish circulation, cold hands and feet; nervous palpitation; profuse sweating, salivation; pains in the back, paræsthesiæ and pains in the extremities, etc., etc.

The condition demands psychic treatment and encouraging words; general dietetic rules according to the individual requirements. Severe mental labor, the use of much alcohol or

tobacco, and sexual excitement are to be forbidden. Moderate exercise in the open air, with avoidance of bodily fatigue, and house gymnastics are advisable; also electro- and hydrotherapy, sea baths, but not laborious mountain-climbing.

Medical Treatment, for the most part symptomatic: Preparations of iron and quinine and Fowler's solution in case of anæmia; stomachics, pepsin, hydrochloric acid, and bitters in dyspepsia. For the insomnia, morphine and chloral should be avoided if possible, and resort be had to general measures. In the evening a warm bath of a half-hour's duration, a cold compress to the head or nucha, or a cold foot bath with rubbing of the legs; general faradization; and a glass of beer or a little generous wine. When these means fail, resort must be had to bromide of potassium (gr. xlv.–℥ i.), extract of cannabis indica or tannate of cannabin (gr. iij.–viij. in powder), urethane (gr. xx.–xlv. in aqueous solution), or paraldehyde (♏ xlv.–℥ i. at night).

DELIRIUM TREMENS.

See Poisoning.

DIFFICULT DENTITION (*Conf.* INFANTILE ECLAMPSIA).

In convulsions for teething, the swollen gum should be incised, and calomel (gr. ½) with jalap (gr. v.) may be given every three hours; if need be, the gums and cheeks may be rubbed with chloroform. Enemas of chamomile tea; warm baths with cold affusions. Bromide of sodium in aqueous solution.

In catarrhal affections of the bronchial mucous membrane, mild laxatives are indicated, but an emetic should be given only in case of absolute necessity. When gastric and intestinal symptoms are present (vomiting and purging), the treatment must be circumspect, especially if the trouble is not catarrhal but reflex, the tongue being clean and the appetite good. Here no astringents are to be given; only a warm bath or perhaps an oil emulsion with a drop or two of tincture of opium. If actual gastro-duodenal catarrh is present, then milk with lime water is to be given; and calomel (gr. $\frac{1}{6}$) with chalk (gr. iss.) every 2 hours.

Skin eruptions, especially crusts on the head and face, are to be treated with an application of poppy-seed oil, which is to

be allowed to soak in for a while; also mild laxatives. Roseolous spots on the skin have no significance.

V. DISEASES OF THE URINARY ORGANS.

Diseases of the Kidneys.

NEPHRITIS (BRIGHT'S DISEASE).

1. Acute Nephritis.

Antiphlogistic remedies, leeches and ice-bags over the region of the kidneys, and mild laxatives. The patient is to remain in bed, and take nourishing food suited to the condition of the digestive organs, especially milk and also buttermilk, but no coffee or tea. Methodical diaphoretic treatment; warm baths, prolonged according to circumstances to an hour, beginning at a temperature of 97° F. and gradually increased by the addition of hot water to 108°; followed by a sweat under woollen coverings; when the fever is high, wet packing continued for a considerable time is enough. Beware of Russian or Turkish baths, or too energetic diaphoresis in general, for the dropsical fluid is a reservoir for the harmful constituents of the urine the too rapid condensation of which may lead to the production of uræmic symptoms. As a medicinal diaphoretic, jaborandi may be cautiously used. As a mild diuretic, acetate of potassium is sometimes useful. For the treatment of ascites, see above under that heading.

In case of suppression of urine, laxatives (senna, frangula) are to be given; for the fever, quinine and digitalis; for the anæmia in long-continued cases, the iron preparations.

2. Chronic Nephritis (Interstitial Nephritis).

A non-nitrogenous diet to supply the loss of albumin by the urine—eggs, milk, oysters. The digestion may need to be assisted.

Methodical diaphoresis as above (see Acute Nephritis), or injections of hydrochlorate of pilocarpine (8 minims of a solution of a grain and a half to the drachm). The patient should drink large quantities of a mildly carbonated water, or milk from a pint to several quarts a day. The dropsy is to be treated by digitalis, acetate of potassium, or calomel (see Ascites).

PERI- AND PARA-NEPHRITIS.

Antiphlogistic treatment in the beginning: ice as long as it is grateful and relieves the pain; mercurial ointment, narcotics; later, poultices. When an incision is necessary it should be made two fingers' breadth below the last false rib on the outer side of the sacro-lumbalis, at the thinnest part of the wall where the aponeuroses of the transverse and oblique muscles unite (nephrotomy).

URÆMIA.

Diuretic measures and derivation to the skin, as for nephritis (hot baths or the pack, and pilocarpine subcutaneously); laxatives; when the fever is high, digitalis and acetate of potassium.

When uræmic symptoms threaten, drastics are called for (colocynth, aloes, croton oil); when they appear, ice-bags to the head and cold affusions to the same part; in case of convulsions, subcutaneous injections of morphine. In severe attacks in strong individuals, venesection is indicated; chloral. In the intervals between the attacks, warm baths and the ingestion of large quantities of fluid are called for in the hope of restoring the secretion of urine.

PYELITIS.

In acute cases antiphlogistic remedies (leeches or cups over the kidneys), and cold compresses only in the beginning. Diaphoresis In cases of severe pain with vomiting, warm baths, warm narcotic poultices over the region of the kidney; morphine by the mouth, subcutaneously, or in suppository; for the tenesmus, lupulin with or without tannin.

In chronic cases, an abundance of carbonated waters, Kissingen or Vichy; tepid baths, milk. In cases following on gonorrhœa, the balsams.

To reduce the suppuration in the pelvis of the kidney, tannin, lycopodium, rhatany, catechu, and lime water with milk. In cases of hemorrhage, drop doses of solution of chloride of iron in water, fluid extract of hydrastis, and acetate of lead; the last is also recommended for use by injection into the bladder (gr. i. in ʒ iv.).

CONCRETIONS, RENAL CALCULI.

For sand and gravel of uric acid or urate of ammonium, the alkaline carbonated waters, Kissingen, Wildungen, Kreuznach, Vichy; bicarbonate or phosphate of sodium, carbonate of potassium or of sodium, carbonate or salicylate of lithium, natural lithia waters. Active exercise, vegetable diet, with pigeons and fruit, much water, no alcoholic liquors, very little nitrogenous food, cheese, gravies, etc.

For ammonio-magnesium phosphate, amorphous phosphates, carbonate of calcium: pure (non-sodic) carbonated waters, vegetable acids, lactic acid.

For cystin and oxalate of calcium, general hygienic treatment, avoidance of excesses of all kinds, moderate exercise, an abundant of water (hot water, seltzer water). The acid phosphate of sodium is a solvent for oxalate of calcium.

RENAL HÆMATURIA.

Absolute rest; ice bags over the region of the kidneys, very cold enemata with vinegar, derivatives. Tannin with acetate of lead, alum, ergotin, lime water, phosphate of calcium, acids, and solution of chloride of iron in the drinking-water.

AMYLOID KIDNEY, AND ADDISON'S DISEASE.

See Constitutional Diseases.

Diseases of the Bladder.

CYSTITIS.

1. Acute Cystitis (Acute Catarrh of the Bladder).

Rest in bed, active diaphoresis, and a low diet, mucilaginous decoctions, almond mixture, milk, but not any spices nor much salt. Ten or twelve leeches may be applied to the perineum, in women to the labia majora. Hot poultices, sitz-baths, prolonged warm baths. Morphine ($\frac{1}{12}$ gram every 3 hours), belladonna, cannabis indica, opium by the mouth or rectum, or with calomel; morphine suppositories. A tablespoonful every two or three hours of a five-per-cent solution of chlorate of potassium. The digestion and the bowels must be looked after. For the tenesmus a vesical injection of 3 or 4 ounces of

starch water with 20 drops of laudanum at a temperature of 99.5°.

In the later stages tannin, hæmatoxylon (3 ss. a day), oil of turpentine. The catheter (elastic and thoroughly aseptic) should be used only in cases of necessity. Wildungen water, or decoction of uva ursi ($\bar{3}$ ss. : $\bar{3}$ iv.).

In case of the formation of an abscess (parenchymatous cystitis, pericystitis) a careful incision will be necessary.

2. Chronic Cystitis.

To be avoided: Coffee, tea, beer, carbonic acid, fatty foods, indigestible vegetables. May be taken: Mild claret, fruits, grapes, meat, milk.

At first warm, gradually changed to cold, baths or sitz-baths. Alkalies as long as the urine is acid; Wildungen, Ems, Vichy, Carlsbad waters; lime water, carbonate of sodium. When the urine is alkaline, acid drinks, phosphoric and benzoic acids.

Astringents: Alum whey, tannin, uva ursi, copaiba, turpentine, tar water, quinine. When the general health is impaired, mild chalybeates, cinchona wine.

Care must be taken that the bladder is completely emptied; in case of atony, ergotin may be given by the mouth, but only when necessary; in cases of long standing, injection of warm starch water (see above) with the addition later of tannin (from ½% increased up to 3%) or acetate of lead (1 to 1,000), best given by means of Hegar's funnel apparatus acting only by hydrostatic pressure; if a catheter is introduced into the bladder, it must be previously thoroughly disinfected. Washing out the bladder twice a day with resorcin is highly recommended, and this is to be combined with the drinking of Carlsbad Schlossbrunn water.

VESICAL CALCULUS.

Conf. Renal Calculi. In addition to the measures there recommended in the case of small concretions, injections of solvents appropriate to the special form of calculus may be made; drinking of Carlsbad, Vichy, or Obersalzbrunn waters; alkalies. Large stones demand lithotomy or the crushing operation.

VESICAL SPASM (SPASMODIC ENURESIS OR DYSURIA).

Warm, general, and sitz baths, warm compresses of hyoscyamus, belladonna, or nicotiana; later, cold baths. Lycopodium ʒ ij. and tincture of opium ʒ ss., in water ℥ vi., in tablespoonful doses; flaxseed tea.

Enemata of aromatic nervines, opium, or belladonna.

Narcotics by the mouth, hypodermically, or in suppositories. In hysterical cases, vaginal suppositories of one grain of opium (also with chloral), and morphine internally with bitter-almond water and tincture of valerian; the bromides, camphor.

Wax bougies with morphine salve may be introduced and allowed to remain for a few minutes. The diet should be the same as that prescribed for catarrh of the bladder. In addition, iron and quinine may be useful.

VESICAL PARALYSIS.

In mild cases, massage over the region of the bladder, cold-water treatment. When hyperæmia of the spine exists, wet cups may be applied to the sacral region.

Catheterization, the introduction of a soft catheter which is to be immediately withdrawn on the appearance of tenesmus, and reintroduced frequently. If catheterization does not succeed, aspiration by means of a fine needle is called for; the needle should be thrust exactly in the middle line just above the symphysis pubis. Injection of cool water, or cold douches and enemas. Mildly astringent vesical injections of red wine, tannin, or zinc. Electricity, tonic hygienic and medicinal treatment. Extract of nux vomica (gr. ⅛ to iss.), cantharidal oil (1 to 6 drops several times a day), ergot, cinchona, valerian, asafœtida with camphor and ammonium preparations.

NOCTURNAL ENURESIS.

If the use of chloral at night, conjoined with abstinence from fluids, is ineffectual, trial is to be made of iron and quinine, cold frictions along the spine, and electricity. Other remedies that are recommended are: Lupulin, gr. i. morning and night; a mixture of tincture of nux vomica ʒ i., tincture of opium ʒ ss., tincture of ergot ʒ ij., 8 to 15 drops morning

and evening; or a pill of extract of nux vomica gr. ¼, and black oxide of iron gr. ij., three times a day; one drop several times a day in sweetened water of solution of the chloride of iron; strychnine. The last-named, injected in not too small dose every two or three days in the sacral region, and later only on a recurrence of the wetting of the bed, is a very efficacious remedy. The faradic current, with one ball-pointed metallic electrode in the rectum, is also of service.

Further, cold sitz-baths, warm aromatic baths (aromatic species with the addition of a glass of brandy), and the introduction of a thin catheter, left *in situ* for 5 to 10 minutes several times a day.

VI. DISEASES OF THE SEXUAL ORGANS.

1. Diseases of the Male Sexual Organs.

GONORRHŒA.

See Infectious Diseases.

EPIDIDYMITIS AND ORCHITIS.

At first energetic antiphlogistic treatment, applications of ice, leeches to the scrotum, supporting the testicles on a cushion, rest in bed; laxatives, morphine.

In cases of severe inflammation in gonorrhœa all injections should be discontinued, and the parts painted with one part of tincture of iodine to 2 to 4 of glycerin or flexible collodion; cold sitz-baths.

Later, iodide of potassium internally, iodide of lead, collodion externally, and strapping with adhesive plaster. A suspensory bandage should be worn.

PROSTATITIS.

The patient should maintain the horizontal position, with leeches and then hot poultices to the perineum; narcotic poultices; hypodermic injections of morphine; mercurial ointment to the perineum; oleaginous enemata. Large quantities of alkaline water should be taken. When distinct fluctuation is made out, a free incision should be made from the rectum.

HYPERTROPHY OF THE PROSTATE.

In the beginning of the affection, laxatives, especially Carlsbad salts, and, when this is no longer sufficient, the catheter must be used. Parenchymatous injections of ergotin or tincture of iodine, and internally iodide of potassium.

FREQUENT POLLUTIONS.

The patient should be watched to see that onanism is not practised during sleep. The evening meal should be light, the patient should sleep on a hard mattress with light bed covering, and should rise early. The action of the bowels should be regulated.

When hemorrhoids exist, Homburg and Marienbad waters are useful; in tuberculosis a whey cure; cold sponging and sitz-baths are of service.

Medicinal treatment consists in the exhibition of lupulin, bromide of potassium, uva ursi, camphor, chloral, iron, cinchona.

Further, the introduction of wax bougies, mild escharotic applications to the prostatic urethra, the cold-water treatment, sea baths.

SPERMATORRHŒA.

Tonics, hydrotherapy, sea baths, exercise, a non-stimulating diet, milk cure. Lallemand's caustic applications are seldom called for. Galvanization of the rectum and perineum. Iron, quinine, lupulin, camphor, bromides, nux vomica, ergot. Regulation of the bowels.

SYPHILIS.

See Infectious Diseases.

2. Diseases of the Female Sexual Organs.

A. Disease of the Uterus.

AMENORRHŒA.

Treatment of any anæmia, chlorosis, scrofula, or tuberculosis, to which the absence of the menses may be referred; the diet should also be looked after, and the action of the bowels

regulated. Emmenagogues are to be used only when no local nor general causative disease can be discovered. In certain cases good results follow scarification of the portio vaginalis; or the application of leeches to this part, to the inguinal region, or to the inner sides of the thighs or the ankles; or cupping. Irritant foot baths, warm sitz-baths, or peat baths; vaginal douches; or operative enlargement of the cervical canal may be called for.

DYSMENORRHŒA.

It may be organic (mechanical), nervous, or congestive.

Rest, warm applications to the abdomen.

Opium, belladonna, cannabis indica in enemata, or vaginal or rectal suppositories; anæsthetics, alcohol, chloral, iron with nervines, borax, nitrite of amyl; the waters of Marienbad, Homburg, or Kissingen.

Discission of the cervix uteri, especially of the internal os; leeches to the portio vaginalis or thighs; foot baths with the addition of nitro-hydrochloric acid.

MENORRHAGIA.

Symptomatic Treatment.—Ergot, gr. xv. in powder or infusion twice a day, ergotin; fluid extract of hydrastis continued for a considerable period during the flow, and in the intervals acids, acetate of lead, digitalis.

Local Treatment. — Cold enemas, prolonged vaginal douches, or injections of hot water (120° F.).

METRORRHAGIA.

The treatment in general is that of menorrhagia. Ice; cold, or much better hot (120° F.), vaginal irrigations with carbolized water, or in extreme cases with solution of chloride of iron, diluted with 1 to 3 parts of water. The clots so formed must be removed, a day or two later, by repeated irrigations of a two-per-cent carbolic-acid solution. In certain cases intra-uterine injections may be cautiously made. The granular mucous membrane of the uterus may be scraped out with the sharp spoon, the operation being preceded by an injection of a one-half-per-cent solution of carbolic acid and followed by one of diluted tincture of iodine. Any foreign body (blighted

ovum or retained membranes) in the uterine cavity must be most carefully removed; and further measures are kneading and compression of the uterus through the abdominal walls, compression of the abdominal aorta, tamponade of the vagina. Ergotin may be administered hypodermically. In collapse, stimulants, injections of ether or camphorated ether, and warmth applied to the skin are called for.

Polypi or other intra-uterine growths are to be removed.

ACUTE PARENCHYMATOUS METRITIS.

Usually complicated with catarrhal inflammation of the mucous membrane.

Local blood-letting, scarification of the portio vaginalis, or the application of leeches to this part or to the abdominal walls. Priessnitz compresses or ice to the abdomen. Narcotics, by the mouth, rectum, vagina, or skin. Tepid baths. Saline purgatives or castor oil. Absolute rest, with the pelvis raised.

Mercury and stimulating emmenagogues must not be given.

CHRONIC METRITIS (CHRONIC INFARCT).

Causes.—Circulatory disturbances, difficult menstruation, interrupted or too frequent pregnancies with subinvolution of the uterus and disturbed lactation; untreated acute metritis or endo-, peri-, and parametritis; excessive or incomplete coitus, onanism; chronic heart and lung affections, and anything that causes frequent hyperæmia of the organ.

Chief Symptoms.—Anæmia, hysteria, enlargement of the uterus, and pain on pressure; frequent desire to urinate; pressure on the bladder and rectum (sacral region); enlargement of the cervix, and cervical catarrh.

Treatment.—A quiet mode of living, nourishing diet; regular evacuation of the bladder, and regulation of the bowels by dietetic or mild medicinal laxatives; scarification of the portio vaginalis once or twice a week. Ulcers of the cervix must be treated, and any malposition of the uterus must be rectified if possible.

Ergotin, by the mouth or subcutaneously, or especially injected into the cervical tissues.

Prolonged vaginal irrigations with water at 120° F., twice

a day, and a saline sitz-bath at night. Priessnitz fomentations (Neptune's belt) to the abdomen. A small sponge, dipped in a solution of iodide of potassium in glycerin (℥ i. : ℥ i.), may be introduced into the vagina at night, and left *in situ* until morning. Uterine douches, tepid at first, and gradually cooled or warmed, as may seem best, are to be used with care.

Balneotherapy.—In mild recent cases, associated with anæmia and irregular action of the bowels, Ems, Neuenahr, and Vichy waters; in cases associated with venous congestion of the pelvic organs, Marienbad, Kissingen, etc.; in simple anæmia, Schwalbach, Brückenau, etc. For bathing, the carbonated and saline baths of Kreuznach, Dürkheim, Kissingen, etc.; in the case of strong women, sea baths; for weakly and very nervous women, the indifferent thermal waters of Landeck, Schlangenbad, etc., are suitable; also peat baths. The different waters for drinking and bathing may be advantageously combined to meet the special indications in individual cases.

ENDOMETRITIS (CATARRH OF THE UTERINE MUCOUS MEMBRANE).

Acute endometritis, which is of rare occurrence, is caused usually by taking cold while menstruating, by excessive sexual intercourse or onanism, gonorrhœa, irritation (cauterization) of the mucous membrane, ill-fitting pessaries, etc. It is manifested, in addition to local pain and slight fever, by a profuse serous, later purulent, discharge and a dark red color and swelling of the cervix.

The chronic form usually follows the acute, or arises from the same causes that produce chronic metritis (see above).

Cervical endometritis (often associated with ulcers or polypi) proceeds from the same causes as corporeal endometritis, and in addition is not infrequently the result of long-continued working of the sewing-machine by a treadle.

Acute endometritis demands removal of the causes as far as may be, rest and free movements of the bowels. Priessnitz fomentations, local astringents only when it has persisted for a long time. Indeed, all local treatment is to be avoided as far as possible, the only exception being local abstraction of blood from the cervix in the case of severe pain.

The treatment of chronic endometritis is first of all causal and hygienic; saline, chalybeate, and sea baths; mild laxatives. Scarifications, weak cleansing injections; repeated washing out with a two-per-cent carbolic-acid, or five-per-cent sulphate-of-copper solution. Only in very obstinate blenorrhœa or parenchymatous disease (indicated by tenderness on pressure) should the following method be undertaken: Local application of the solid stick, intra-uterine injections of a very dilute solution of chloride of iron, tincture of iodine, glycerin, and stronger nitrate of silver and tannin solutions. The latter must be done only when there is a perfectly free outlet to the injected fluids; and in case there is none the cervical canal must be dilated with thoroughly aseptic sponge or tupelo tents; or the fluid, after remaining in contact with the mucous membrane for a time, must be drawn up again into the syringe. A very effective method is the application of tincture of iodine, chloride of iron, or carbolic acid (1 to 4 of water) by means of a sound, the end of which for about an inch is wound with a cotton thread. This mode of treatment requires a long time. Douches of a one-per-cent solution of chloride of zinc warmed to 99.5° F., and the use of tampons soaked in the same are highly spoken of. Astringent applications may be made in glycerin ointment or suppositories. The treatment of cervical catarrh is in general that of corporeal endometritis; especially useful being applications of a one-per-cent solution of chloride of zinc, of nitrate of silver in strong solution or solid stick, and of carbolic acid; astringent (tannin) pencils, or applications by means of a sound wrapped around with cotton. For the repression of granulations, the sponge tent is useful. The Nabothian glands should be frequently punctured; in case of exuberant growths, tincture of iodine, solution of chloride of iron, or the actual cautery should be used. Finally, amputation of the cervix may be necessary.

RETRO-UTERINE HÆMATOCELE.

The treatment is expectant and symptomatic. In the beginning, cold injections into the rectum and vagina; ice on the abdomen and in the vagina; mild laxatives, narcotics.

Only in urgent cases should a puncture be made from the vagina, and in case of sepsis drainage should be made and

antiseptics injected. The entrance of air is to be carefully guarded against.

PERIMETRITIS AND PARAMETRITIS.

Etiology.—Metritis and endometritis, malpositions of the uterus, ovarian tumors, rupture of small ovarian cysts, bleeding from a Graafian follicle, gonorrhœa, menstrual disorders, traumatisms (also difficult labor).

Treatment is that of peritonitis, viz., actively antiphlogistic; leeches, opium, ice. In chronic perimetritis, scarification of the cervix, Priessnitz fomentations, sitz-baths of 95° cautiously warmed or cooled, according to the patient's sensations. The bowels are to be kept open. Iodine, and saline baths containing iodine or bromine. Parametritis without any complications, calls for rest, Priessnitz compresses, and mild laxatives. After the fever has disappeared, iodide of potassium is to be used to promote absorption of the exudate; or peat baths or a course at Marienbad. When fever is high, quinine in effective doses, or salicylic acid or some other antipyretic. Good wine should be given in generous quantity.

B. Diseases of the Ovaries.

ACUTE AND CHRONIC OÖPHORITIS.

Sexual intercourse is to be forbidden, the diet must be regulated, and mild laxatives given. Repeated abstraction of blood from the cervix (scarification). Cold or hot applications, according to the sensations of the patient; Priessnitz compresses during the night. Morphine or opium suppositories; tincture of iodine to the abdomen; saline sitz-baths. The anæmia, when present, calls for treatment.

OVARIAN CYSTS.

Tonics and mild laxatives. Iodine (Krankenheil waters) relieves the distressing symptoms and retards the development of the tumor only for a short time. Puncture is also only palliative; but when it is combined with injection of iodine, in the case of simple cysts, it is sometimes curative. Ovariotomy is usually the only cure.

C. Diseases of the Vagina.

ACUTE AND CHRONIC CATARRHAL VAGINITIS.

The general treatment is the same as that of metritis and endometritis.

In the acute form, after the subsidence of the inflammatory stage, one or more cauterizations may be made with nitrate of silver; tincture of iodine; later milder astringents, irrigations, with a weak, tepid solution of permanganate of potassium; cleansing injections, followed by dusting the entire vagina with iodoform through a speculum, and during the night a tampon smeared with alum ointment (5 to 30 of lard), or glycerin, pure or containing tannin or boric acid; also tannin suppositories in the vagina.

Chronic vaginitis (fluor albus) demands lukewarm cleansing douches of one of the alkaline mineral waters (Ems, Neuenahr), and the more protracted cases solutions of tannin, alum, or sulphate of zinc. In country practice among the poor, injections may be ordered several times a day of a decoction of oak bark. Applications may be made by the douche, tampons, small sponges, or tannin pessaries.

VAGINISMUS, HYPERÆSTHESIA OF THE VAGINA.

All attempts at cohabitation should be forbidden. Any anomalous condition or disease should be treated. The parts may be painted with lead-water, nitrate of silver (1 to 50 solution), carbolic acid (1 to 30), or cocaine (1 part in 2 of alcohol and 3 of water). Finally, gradual dilatation of the introitus vaginæ, by means of glass cylinders, which may be left in position for an hour; or forcible dilatation under chloroform, which is more rapid. The most certain method consists in the careful excision of all the remains of the hymen and splitting of the vaginal mucous membrane throughout its entire length, as recommended by Marion Sims. Internally, iron and the bromides.

PRURITUS VULVÆ.

When anæmia is present, iron may be given; the bromides; veratrine. Any eczema that may be present must be treated. Twice a day a warm sitz-bath, to which some potash has been

added, is to be taken. Applications of carbolic acid of a strength at first of 1 to 60, and gradually reduced to 1 to 20 or 1 to 10; also alum or diluted solution of the chloride of iron. Ichthyol or boric-acid ointment with cocaine (1 to 100); lotions and compresses of a concentrated solution of borax.

D. Diseases of the Breasts.

MASTITIS.

Removal of all mechanical sources of irritation. Priessnitz fomentations before, and warm applications during, suppuration; moderate pressure (bandaging the breast). Large incisions in a direction radiating from the nipple (not transversely, for fear of cutting through some of the milk ducts) under strict antiseptic precautions, drainage being provided for. Mild laxatives.

SORE NIPPLES.

Touching with five-per-cent carbolic-acid solution once or twice a day, and in the intervals an application of three-per-cent carbolic oil, a nipple-shield being used; or dusting with powdered gum Arabic after each nursing. Liniments of balsam of Peru, castor oil, benzoin, borax, glycerin, oxide of zinc. Cauterization with nitrate of silver; or compresses wet in red wine (very painful).

As a prophylactic measure, the nipples should be bathed frequently with water, brandy, or weak tannin solutions.

TO ARREST OR INCREASE THE SECRETION OF MILK.

Chloral, bromide of potassium, atropine, sulphate of potassium, melilot (sweet clover), and sage appear to be of service in arresting the secretion of milk; domestic applications for the same purpose are made of hops or walnut leaves. Strychnine, digitaline, caffeine, and jaborandi are credited with the property of increasing the lacteal secretion.

VII. CONSTITUTIONAL DISEASES NOT DUE TO INFECTION.

CHLOROSIS.

Iron, as much as possible in a short space of time, but only in preparations which are well borne by the patient, and do not disturb the digestion. Chalybeate waters. Tonics, milk-cure, regulation of the action of the bowels, hygienic measures, change of air.

PERNICIOUS PROGRESSIVE ANÆMIA.

The most nutritious diet possible. Iron and other blood-forming remedies. Transfusion. Arsenic; phosphorus in small and gradually increasing doses. If the presence of intestinal parasites is suspected, anthelmintics, preferably male fern, should be given.

SCURVY.

Prophylaxis.—Fresh vegetable diet, lemon juice, pure air, dry living apartments, good drinking-water, dry warm clothing.

General Treatment.—Juices of fresh herbs of all kinds, especially of the family of Crucifers, water-cress, radishes, mustard, horse-radish; then cabbage, lettuce, sauerkraut; acid fruits, lemons, apples, black cherries; vegetable acids, citric, acetic, and tartaric acids; fresh beer-yeast mixed with equal parts of honey, in doses of a tablespoonful every two hours; mulled wine; mineral acids; tonics, especially quinine, bitters, and aromatics.

Diet.—Fresh meat, soft-boiled eggs, egg and milk, wine, beer.

For scorbutic affections of the mouth, spirit of cochlearia diluted with water as a mouth wash; also sage tea, rhatany, chlorate of potassium, alum; painting the gums with equal parts of tincture of iodine and tincture of aconite with warm vinegar and a little brandy. For the bad odor from the mouth, washing out with permanganate of potassium (gr. i. : ℥ vi. of water), salol, or linden-wood charcoal with water. For the scorbutic ulcers of the gums, applications of nitrate of silver,

chromic acid (5 parts to 300 of water), or hydrochloric acid (1 to 6 of water). For the ecchymoses of the skin, washing with cold water, spirit of camphor, beer-yeast poultices.

PURPURA HÆMORRHAGICA, MORBUS MACULOSUS WERLHOFII.

An affection identical in its essence (blood changes) with scurvy, and for which the treatment is in general the same, only here the mineral instead of the vegetable acids are to be given; also styptics, solution of chloride of iron, acetate of lead.

℞ Acidi sulphurici, ... ʒ i.
Alcohol. . . . . ʒ iij.
Syr. rubi idæi, ... ℥ ss.
Decoct. cinchonæ (Cinchon., ʒ v.), . . ℥ viij.
M. S. A tablespoonful every two hours.

In addition restoratives are indicated, and the strictest rest must be enjoined.

LEUCOCYTHÆMIA.

Fowler's solution in small initial doses gradually increased to 45 minims a day in divided portions, but never on an empty stomach. Quinine in large doses; douching over the spleen. In the joint affections, iodide of potassium (gr. x.–xxx. a day). In vomitnig, broken ice. In diarrhœa, solution of chloride of iron in proper dilution. Repeated transfusions. To reduce the size of the spleen, in cases of chronic enlargement, parenchymatous injections of fluid extract of ergot, also of Fowler's solution (?).

SCROFULA.

Hygienic measures, fresh air, healthy sleeping-apartments, nitrogenous (meat) diet, tonics, especially iron (pyrophosphate).

Cod-liver oil; phosphate of lime; iodine, either the syrup of iodide of iron or iodide of potassium, or the iodine waters; acorn coffee, butternut leaves, calamus, rhubarb; mineral-water baths, saline and sea baths (not in scrofulous ophthalmia); cold-water treatment (in the torpid form with sluggish metabolism); frequent cold wet packs.

At the same time local treatment of the bone and joint affections, skin eruptions, catarrhs, eye troubles, and especially

the enlarged glands (parenchymatous injections of iodine; arsenic, collodion, idiode of lead externally, early evacuation of pus, or extirpation). To avoid the production of scars, the abscesses may be punctured in several places with a hollow needle, through which aspiration may be made; after the removal of the needles, further evacuation of pus may be secured by pressure. The punctures are to be repeated every few days. The posterior surface of the body and legs should be methodically rubbed twice a week in the evening with a tablespoonful of soft soap, and washed off at the end of ten minutes.

DIABETES INSIPIDUS.

An abundance of good food, with careful attention to the digestion. Good care of the skin. Water may be taken as desired. Extract of valerian in large doses, up to ʒ i. a day. Extract of ergot. Jaborandi or pilocarpine, and carbolic acid. Opium for the relief of the manifold troubles associated with the disease, but not in doses large enough to disorder the digestion. The constant current may be applied to the spine and over the region of the kidneys.

DIABETES MELLITUS.

The patient must avoid all substances which are excreted in the form of sugar, as starchy and saccharine matters; bread, potatoes, sugar, leguminous vegetables, rice, sago, beer, sweet wines and fruits such as grapes, plums, cherries, and all kinds of flour and meal. Instead of ordinary bread the patient may take bran or gluten bread; or thin slices of bread treated with an infusion of malt (by means of the diastase of which the starch is converted into sugar and dissolved out), then washed, dried, and toasted. Those surrogates of bread (which are not very digestible) cannot usually take the place of the latter for any great length of time, and, as a rule, a small quantity of bread must be allowed from time to time. Saccharin is recommended as a harmless sweetening material, but it often excites disgust after use for a little while.

On the other hand, milk can be taken in moderate quantities, for milk sugar has often no influence on the excretion of sugar in the urine; its effect should, however, be watched, and

it should be discontinued if the amount of sugar is sensibly increased. Sour milk is often better borne than sweet. Green vegetables are also allowed, such as spinach, cauliflower, and the lighter cabbages; kidney beans, asparagus, celery, radishes, cucumbers, cress; lettuce and endive salads, walnuts and almonds; edible mushrooms; also the fruits containing little sugar, such as strawberries, raspberries, and currants, and peaches, lemons, and oranges.

The chief and, as far as possible, sole article of diet should be meat (combined with the administration of lactic acid in the form of lactic-acid lemonade—containing from ʒ i.–v. of lactic acid and ℥ i. of fennel, anise, or cinnamon water to the quart—of which ℥ iij. with gr. viij. of bicarbonate of sodium may be taken every two hours). The patient should therefore subsist chiefly on bouillon, rare beefsteak, and the like, caviare, fish, oysters, crabs, eggs (the white in any amount, the yolk in limited quantity), cheese, butter (in large quantities up to five ounces a day), lard, and other fats. Coffee and tea (not too strong) may be allowed in moderation; they may be sweetened with mannit, glycerin, or saccharin; red wine in water, carbonated waters, and also pure well water in quantity sufficient to satisfy the thirst. A "diabetic drink" consists of citric acid ʒ iiss. and glycerin ℥ iij. in a quart of water.

In case of digestive disturbances and a repugnance to meat, which are very apt to arise, the meat must be reduced in quantity, and a little bread allowed temporarily. The medicinal treatment consists in the administration of opium (gr. iss.–v. in the twenty-four hours), morphine up to gr. iss. a day, or codeine up to gr. vi. a day. Little good results from the administration of alkalies, salicylic or carbolic acid, glycerin, or arsenic. Exercise, short of fatigue, attention to the cutaneous functions, warm clothing. Carlsbad and Neuenahr waters are recommended.

RHEUMATISM.

Acute Articular Rheumatism.

Salicylate of sodium is the capital remedy; also antifebrin and antipyrine. The affected joints must be immobilized by padded pasteboard splints; flying blisters and other forms of counter-irritation; anæsthetics (ether, benzin, chloride of

ethyl); methodic subcutaneous injections of a two-per-cent carbolic-acid solution, or morphine; ice to all the affected joints; chloral, salol. The so-called specific antirheumatics (colchicum, aconite, citric acid, nitrate of potassium and of sodium, iodide of potassium, propylamin) are for the most part superfluous. For the troublesome sweating, atropine may be given in dose of gr. $\frac{1}{60}$.

When the symptoms are intermittent in character, quinine may be given in large doses (gr. xv.–xxx. twice a day). By way of prophylaxis against complications, bicarbonate of sodium may be given in doses of ʒ v.–x. a day in sweetened water until the urine is neutral in reaction, and then continued in smaller doses; or one drop of stronger water of ammonia several times a day.

Chronic Articular Rheumatism.

In acute exacerbations of the chronic disease, painting with iodine, blisters, and especially the constant galvanic current. Leeches if the joint is very painful and greatly swollen. The remedies mentioned under the acute form may also be tried.

For the occasional pains in the joints, protracted warm-water, Russian, Turkish, or hot sand baths. Cold douches. Foot baths.

When the disease is very obstinate, sulphurated potassa baths ($\frac{1}{4}$ to $\frac{1}{2}$ a pound to the bath, which should be at a temperature of 99.5°, and be continued from one-half to one hour), after which the affected joints should be rubbed with camphorated oil and enveloped in camphorated cotton. In the morning and evening a blister may be made with cantharidal plaster near the joint, and then veratrine, gr. $\frac{1}{16}$, mixed with gum Arabic, gr. v., applied to the raw surface; this is to be repeated in two days, and the parts then covered with oxide of zinc ointment.

Baths of Teplitz, Wiesbaden, or Aachen; strong hot saline baths; sulphurated peat baths.

Muscular Rheumatism, Rheumatic Myalgia.

In very recent cases, cupping or painting with iodine; the electric brush with a strong galvanic current; rubefacients, soap liniment, etc.; veratrine, aconite, or ichthyol ointment; morphine subcutaneously; massage.

In traumatic lumbago, ice compresses.

Internal remedies: Chloral, colchicum, guaiac; diaphoretics; iodide of potassium; salicylate of lithium.

Balneotherapy.—At the beginning in acute cases, warm tub, vapor, or hot-air baths; in chronic cases, methodically repeated very warm baths (sometimes with sulphurated potassa), followed by a sweat under woollen coverings; in inveterate cases, cold-water treatment. Among the mineral baths may be mentioned Teplitz, Aachen, and Wiesbaden; sulphur, peat, saline, and carbonated baths; hot sand baths.

GOUT (PODAGRA).

Treatment of the Gouty Diathesis.—A preponderatingly vegetable diet with but little fatty food; exercise; avoidance of beverages which retard metabolism (the alcoholics in general, especially champagne, with the exception of a little mild claret, coffee). An abundance of fruit and vegetables. Milk, whey, and water (containing soda) cures, but better yet the mineral-water cures (Kissingen, Carlsbad, Teplitz, Wildbad, Wiesbaden, and the lithia waters, natural and artificial). Sponging with cool water. Regulation of the digestion and improvement of the general strength.

Bicarbonate of sodium, a heaping teaspoonful three times a day, one-half to one hour before meals, in a pint of water at a temperature of 86° to 104° F. Carbonate or salicylate of potassium or of lithium; acetate of potassium; lime water.

Treatment of the Attack.—Low diet, watery soups, cooked fruit, avoidance of meat; waters containing soda, no alcoholics; in case of heartburn, magnesia.

The affected member should be wrapped in cotton and kept elevated, with applications of oil of hyoscyamus with chloroform, opium ointment, benzin, ichthyol salve; and in sluggish cases, tincture of iodine, afterward covering the part with gutta-percha tissue.

Internally the chief remedy is salicylate of lithium (gr. xv. every half to one hour) in about half a pint of slightly warmed acidulated water; and when the pain begins to subside, the same dose is to be continued three times a day, until perfect recovery is established. Salicylate of sodium may be given instead in doses of 45 grains twice a day. Aconite, colchicum

(20 to 30 drops four times a day of tincture of the seeds); chloral, morphine subcutaneously. Turkish baths.

ARTHRITIS DEFORMANS.

Internally.—Salicylate of sodium, iodide of potassium, bicarbonate of sodium with rhubarb, until the bowels have been moved two or three times.

Externally.—Avoid wetting the hands; painting with iodide of potassium; enveloping the hands in hot bran; sand baths. Wildbad, Aachen, and Teplitz.

RACHITIS (RICKETS).

Prevention and cure of digestive disturbances and diarrhœa; suitable nourishment (for infants mother's milk or efficient substitutes therefor), animal food, glutens. Hungarian wine. Baths, especially salt-water baths. Fresh dry air. The child should lie on a tolerably hard mattress with a ring-shaped pillow.

Cod-liver oil, calamus, rhubarb, phosphorus, pyrophosphate or albuminate of iron, phosphate or carbonate of calcium, lime water. Orthopedic treatment after the complete subsidence of the disease.

OSTEOMALACIA.

Improvement of the hygienic conditions. Lime, cod-liver oil, iron. The woman should be cautioned concerning the danger of a new conception.

PROGRESSIVE MUSCULAR ATROPHY.

See Diseases of the Spinal Cord.

TRICHONOSIS.

Benzol. Glycerin. See these drugs in Part II.

RHEUMATIC, CATARRHAL, HERPETIC, EPHEMERAL FEVER.

A mild, sometimes high (but not long continued) fever, standing in no relation whatever to the slight local symptoms present.

Diaphoresis, jaborandi, occasionally also symptomatic remedies.

AMYLOID DISEASE.

Progressive amyloid degeneration of the liver, kidneys, spleen, and lymph-nodes.

Etiology.—Scrofula, rickets, phthisis, protracted suppuration, cancerous, mercurial, or malarial cachexia, syphilis, gout.

Therapy.—As far as possible causal; removal of incurably suppurating limbs, energetic treatment of syphilis if present, etc. In addition, iodide of potassium, syrup of iodide of iron, ammonio-ferric chloride; easily digestible nutritious food; baths. For the dropsy, boro-tartrate of potassium and sodium, diaphoresis. (*Conf.* Bright's Disease.)

ADIPOSIS (OBESITY).

1. Banting-Vogel Method.

Avoidance of all fats such as butter, oil, lard, fat fish, and fatty foods of every kind; and also of fat-forming substances, such as starches, gums, sugar, honey, potatoes, farinaceous food, bread, beer rich in malt, heavy sweet wines, grog, etc.

Diet List.—1. Breakfast: Coffee with very little or no milk or sugar, a little toast, no butter, no sweet cakes.

2. Luncheon: For rather large eaters, two soft-boiled eggs, a little raw lean ham or other lean meat, a cup of tea or a glass of thin sour wine.

3. Dinner: A plate of thin meat broth, boiled or roast lean meat, green vegetables, stewed fruit, a little potato and a small quantity of bread; followed by a cup of black coffee.

4. Supper: Meat broth or tea with cold meat, lean ham, soft-boiled eggs, salad, and a little bread.

Voit computes the average daily amount of the different kinds of food, taken under the Banting system, as follows: Albumin, 8 oz. 2½ dr.; fat, 2 dr.; carbohydrates, 1½ oz. This method is effectual in reducing the flesh, but when too long continued is dangerous to life.

2. Ebstein's Method.

This consists in reducing the amount of nourishment taken without causing the patient to suffer greatly from hunger, or reducing his capacity for work. Three meals only are to be

allowed, no luncheon and no late supper. The amount of carbohydrates is reduced, and sugar, sweetmeats, potatoes, and beets are forbidden.

Diet List in Uncomplicated Obesity.—1. Breakfast (in winter at 7:30, in summer at 6 or 6:30): A large cup of black tea (about one-half pint) without milk or sugar; an ounce and a half of white bread or toasted brown bread, with plenty of butter (up to one ounce).

2. Dinner (between 2 and 2:30): Soup, often with bone marrow served in a fatty layer floating on the soup, and not melted and incorporated with it; from four to six ounces of roast or boiled fat meat with plenty of gravy; vegetables in moderate quantity, preferably the leguminous kinds and also cabbage, but very little beet, because of the sugar it contains, and no potato; salad or some stewed dried fruit, apple sauce, steamed cherries without sugar. Two or three glasses of a light white wine. For dessert a little fresh fruit, and soon after dinner a large cup of black tea without milk or sugar.

3. Supper (about 7:30 or 8 o'clock): In winter almost regularly, in summer occasionally, a large cup of black tea without milk or sugar; an egg or some fat roast meat, or both, or fat ham, German sausage, fresh or smoked fish, about an ounce of white bread well buttered (3 to 5 drachms), and sometimes a small piece of cheese and some fresh fruit.

Voit reckons the average daily amounts in this diet (containing about 8½ ounces of roast meat, or ⅔ of the amount allowed in the Banting treatment) as follows: Albumin, 3 oz. 1½ dr.; fat, 2 oz. 5 dr.; carbohydrates, 1½ oz.

By reason of the large amount of fat in the food, the feeling of satiety is sooner produced, thus rendering possible the reduction of the amount of nourishment taken to the lowest limit.

3. Oertel's Method.

It consists in general of a change in the quality and quantity of food taken, as well as in the patient's mode of life; a transition from a life of comfort and ease, to one of activity and work; but especially in a reduction of the amount of fluids taken, and the avoidance of drinking at meal-time.

The method is divided into two parts—1st, reduction of the amount of fluid in the body, especially in the blood; and 2d,

mechanical correction of circulatory disturbances and strengthening of the heart muscle.

Diet List.—(Patients who suffer from a simple excess of adipose tissue, without any complications, are allowed much latitude; but those whose obesity is complicated with respiratory or circulatory changes are bound strictly to the prescribed quantities.)

1. Breakfast: Coffee or tea with milk (in all 5 ounces) and 2½ ounces of bread.

2. Dinner: No soup, and at most 3 to 6 ounces of boiled or roast beef, veal, game, or not too fat fowl; salad or light vegetables in any desired amount; fish cooked with little grease; 6 drachms of bread, or occasionally some farinaceous food, in quantity not to exceed 3 ounces. For dessert 3 to 6 ounces of fruit, preferably fresh, but, if need be, occasionally a little preserved fruit. It is better to drink nothing during the meal; but when the weather is very hot, and in the absence of fruit, from 5 to 8 ounces of light white wine may be taken.

3. Tea: Coffee or tea as at breakfast, with not to exceed 5 ounces of water; in exceptional cases, about 6 drachms of bread may be taken.

4. Supper: One or two soft boiled eggs, 5 ounces of meat, 6 drachms of bread, a small bit of cheese, salad, and fruit; as a drink 5, to 8 ounces of wine mixed with 4 ounces of water.

It is specially enjoined not to take fluid in large quantities at a time, but to drink the prescribed amount for the day in small portions.

The heart is to be strengthened by methodical exercises, either walking on a level or climbing ascents, according to the ability of the patient.

ADDISON'S DISEASE.

Symptomatic treatment, a quiet mode of life, good nourishing food, cardiac stimulants, iron and quinine; tonic sea baths.

DROPSY. (*Conf.* ACUTE NEPHRITIS AND ASCITES.)

Local or general anasarca, often combined with ascites.

Etiology (it is always a symptom of some other disease). —Bright's disease, valvular disease of the heart and obstruction to the circulation in the lungs (chronic pneumonic exuda-

tions, tuberculosis, emphysema, and atelectasis); great debility and disorders of nutrition (anæmia, chlorosis, malarial cachexia, typhoid fever); abdominal tumors.

When the cause cannot be removed, only temporary relief can be looked for from the use of the following:

Resorbents.—Methodical diaphoresis by means of baths of one-half to one hour's duration with the temperature gradually raised by the addition of hot water to 104° F.; alcoholic and other vapor baths. (Beware of cases of weak heart, capillary bronchitis, fever, too great exhaustion); packing in warm bran, fumigations with juniper. Diuretics, especially borotartrate of potassium and sodium, acetate of potassium, in infusion of digitalis, squill; Wildungen water. In some cases drastic purgatives may be used with caution. Cockroach (gr. v. daily in powder).

Tonics.—Cinchona, iron, blessed thistle, etc. An albuminous diet, improved conditions of living, etc.

In the case of ascites with great dyspnœa, paracentesis: removal of the fluid in small quantities at a time, combined with compression of the abdomen with a bandage. Beware of scarifications.

VIII. INFECTIOUS DISEASES.

TYPHOID FEVER.

Fresh, cool air (56° to 66° F.), obtained by treating the patients in tents or huts; perfect cleanliness; rest in a smooth bed, avoiding creases in the sheets, and sponging the back with cold water; cleaning the teeth with a brush several times a day.

Wine in abundance to drink—light clarets, etc.; in mild cases, stronger sherry, port, or champagne; in severe cases, in amounts varying from a pint up to several quarts in the twenty-four hours, according to the severity of the disease. In fever alcohol reduces the temperature, but does not intoxicate. In cases of collapse, hot tea or coffee with brandy; as much water as the patient will drink, especially when the tongue is dry and fissured.

For nourishment, easily digestible nitrogenous and carbonaceous food—by preference milk, from one to several quarts

a day, with 1½ to 3 ounces of brandy. Meat broth with egg, meat juice, peptone preparations, prepared foods.

Whether calomel acts as an abortive remedy is a debatable point, but certain it is that the drug in three or four doses of gr. viij. each, given within the first nine days of the disease, does almost always, after several watery stools have been had, lower the temperature very decidedly for a day or two, and apparently renders the subsequent course of the disease milder. A possible explanation of this effect is that it destroys some of the bacilli by the formation of corrosive sublimate in the intestinal canal.

Of antipyretics quinine only is to be considered, given when necessary in large single doses (gr. xxx.–xlv.) or in smaller divided doses (gr. viij.–xv.) every second evening. Of all the means recommended for reducing the temperature and keeping it from rising, the only one which is effectual and at the same time exerts a favorable influence on the course and termination of the disease, is the immediate abstraction of heat by cold water after Ernst Brand's method. By means of this the cerebral symptoms—broncho-pneumonia and decubitus—can be almost wholly prevented; the weak heart is strengthened, the appetite is preserved, and the second stage as well as the convalescent period is decidedly shortened. The following are the directions for employing the water treatment, by which we mean the cold bath: It should be begun early, even when the diagnosis is still uncertain. The colder the water, the shorter should be the bath (from three to at most ten minutes). The higher the temperature remains after the bath, the more frequently must it be repeated, and the cooler should the water be. In general, in moderate cases in strong adult patients, when the rectal temperature is from 102° to 104°, one bath of ten to fifteen minutes' duration at a temperature of from 59° to 68°, day and night, will suffice. The number of baths may, however, in severe cases during the first and second weeks reach twelve to sixteen or more, while later half that number and less will be sufficient. After each cold bath the hands and feet should be well dried, and a warm bottle should be placed at the feet. Before and after each bath the patient should take a good swallow of some strong wine.

This method has been employed repeatedly, even in the case of pregnant women, with good results.

Children, the weak and the aged, and also patients in the later stages of the disease, are to be placed in a bath at a temperature of 86°, and then cold water may be poured on the head in quantity sufficient to cool the bath down to about 77°. The baths may be of five or ten minutes' duration, and can be repeated several times a day.

Absolute contra-indications to cold baths are: peritonitis, whether preceding or following perforation; also profuse intestinal hemorrhage (not a mere tinge of blood), in which cases symptomatic treatment is in order.

If the baths are absolutely refused, cold sponging must be resorted to; and if this is resisted, then sponging the entire body with wine or vinegar every one to three hours, alternating with cold enemata.

When the temperature rises above 102°, in addition to the baths, packing with cold wet sheets (covered with blankets), the legs being left free, for ten minutes at a time, from four to six times in succession, will render good service. For this purpose two beds must be placed alongside of each other, and the patient changed from one to the other. Or, if only one bed can be used, the packing may be longer continued, the sheets being sprinkled every fifteen to thirty minutes with as cold water as can be borne. This packing may in a measure replace the baths if the temperature does not rise above 102°, and is useful especially in children when there is great excitement, active delirium, and jactitation.

For capillary bronchitis, cold douching in a warm bath, mild expectorants, solution of anisated ammonia.

Immoderate diarrhœa, more than two or three stools a day, is to be treated with tannin, acetate of lead (gr. ½) with opium (gr. ⅓), nux vomica, subnitrate or salicylate of bismuth, nitrate of silver, alum, columbo; enemas of starch water with laudanum or nitrate of silver (gr. iss.–iij.).

Intestinal Hemorrhage.—Broken ice, ice to the abdomen, opium in frequent small doses, alternating with 5 drops of solution of chloride of iron, alum-whey; ergotin subcutaneously; and in addition ice-water enemata with opium and alum.

In constipation and fecal accumulation, which is strenuously to be avoided, enemas are to be given of plain water, or soap-suds and oil, every day if necessary.

Meteorism.—Cold compresses on the abdomen, changed

every half-hour; applications of oil of turpentine; cool enemas with oil; or the introduction of a rectal tube.

Retention of urine must be relieved at once by the catheter.

Perforation.—Opium, gr. i. every two hours; absolute rest; no drinks—only ice in the mouth.

Laryngeal Ulceration.—Warm mucilaginous drinks.

Bed Sores.—Prophylaxis consists in bathing the back with alcohol or brandy, and the use of air or water cushions. When excoriation has occurred, lotions of lead-water or carbolic-acid solution, collodion, ointment of tannate of lead, cataplasma ad decubitum (see Plumbi Tannas in Part II.).

TYPHUS FEVER.

The treatment should follow the same lines as that laid down above for typhoid fever, viz.: careful nursing, preservation of the nutrition, rational reduction of the temperature by baths, etc. In only exceptional cases are antipyretics to be given, and then preferably quinine.

RELAPSING FEVER.

The treatment is expectant and symptomatic; a cooling regimen, ice to the head, good nursing, nourishing food, wine; antipyretics and heart stimulants when necessary; large doses of quinine are highly recommended; restoratives in collapse.

Morphine in severe muscular pain and delirium after the crisis (from inanition); for the pains, rubbing with chloroform liniment.

Acute Exanthemata.

SCARLATINA (SCARLET FEVER).

Complete isolation of the patient as early as possible, and thorough disinfection of all articles used in the sick-room.

The temperature of the room should be low (59° to 66°), and ventilation should be secured. Plenty of water to drink (acidulated if desired), keeping the bowels open with stewed fruits, enemas, or very mild laxatives. The body may be rubbed with bacon or ointments (1:100 carbolic-acid salve).

Avoid giving calomel. The patient must keep to the bed, even during the stage of desquamation; baths at the body temperature assist this latter process. In high fever (102° to 103°), cold baths (59° to 68°) for five or ten minutes at a time; or packing in cold wet sheets repeated whenever the temperature rises to this point. Or quinine or some of the other antipyretics may be cautiously given.

Cerebral symptoms will require narcotics; convulsions, cold water on the head. For the sore throat, cold or Priessnitz compresses, disinfectant gargles.

For the treatment of complicating diphtheria, see below under this head.

Nephritis.—If there is blood in the urine, a few leeches may be applied over the kidneys, and mild laxatives given. Diuretics are not advisable. If the urine is free from blood, but dropsy exists, warm baths may be given, followed by wrapping the body in blankets. Water (containing soda) is to be taken in abundance. In collapse, wine.

MORBILLI. MEASLES.

Good nursing and an appropriate diet; fresh, pure air of about 70° F.; an only moderately darkened but roomy apartment, direct light in the eyes being avoided. Tepid drinks, milk, sweetened water, linden-flower tea; rubbing of the skin with bacon; cold, mildly astringent compresses in conjunctivitis. Baths of ten or fifteen minutes' duration in water at a temperature of 81° to 84° are often grateful.

Very mild laxatives in case of constipation; emulsions, astringents (no narcotics), and cold compresses for diarrhœa. For irritable cough, sweet mucilaginous tepid drinks; if necessary, bitter-almond water or decoction of althæa with $\frac{1}{3}$ grain of tartar emetic.

In case of severe bronchial catarrh, handkerchiefs wrung out of cold, or sometimes warm, water should be applied to the chest and throat, and covered with gutta-percha tissue; warm baths may be given.

In false croup, hot milk, hot poultices, baths at the body temperature for a half-hour, followed by douching of short duration; hot wet cloths or sponges around the neck, or a piece of bacon to the throat; and if necessary, emetics.

RÖTHELN (GERMAN MEASLES).

Requires no treatment, or at most a symptomatic one similar to that for measles.

VARIOLA AND VARIOLOID (SMALL-POX).

The treatment is expectant and symptomatic. Pure, fresh air, light bed-covering, and good nourishing food.

In case of high fever with a burning skin, ice-bags or cold compresses to the head; cold sponging of the entire body, or cold baths to reduce the temperature. Ice-water compresses on the inflamed skin, Priessnitz packing of the hands and feet. Xylol has been proposed as a specific (?). The mouth must be kept scrupulously clean by rinsing out with a 1:50 solution of chlorate of potassium. When the pustules are drying up, frequent prolonged warm baths should be given.

To prevent pitting, the face should be painted with collodion, or better with a diluted tincture of iodine, several times during the eruptive stage; other applications that have been recommended are compresses wet with a 1 or 2 : 2,000 sublimate solution, or an ointment composed of 3 parts of tar, 5 of yellow wax, and 1½ of mercurial ointment.

Cold drinks should be allowed freely, Seltzer water; mild stimulants, diluted wine. The treatment of the complications should follow the general rules. Abscesses of the skin and furuncles should be opened early.

VARICELLA (CHICKEN-POX).

Requires no treatment, or at most mildly antipyretic measures in the beginning, and protection of the vesicles from rubbing.

MILIARIA.

A cooling regimen, acidulated drinks (mistura sulphurica acida or muriatic acid, 20 drops to 4 ounces of water). Change of the underclothing. For the sore throat, sinapisms, dry cups. Sponging with tepid vinegar. Mild laxatives.

ERYSIPELAS.

Simple dietetic treatment. Collodion; tincture of iodine. To limit the spread of the erysipelas, subcutaneous injections of a three-per-cent carbolic-acid solution may be made around

the diseased part, the needle being passed into the skin at a distance of $\frac{2}{5}$ to $\frac{3}{5}$ of an inch from the margin of the redness and directed toward it; too large doses must not be injected, and the method should not be employed on the scalp. Another procedure is to encircle the reddened portion with a ring of ichthyol-collodion (ten per cent).

To relieve the tension and pain, applications of oil, covering with cotton, or Priessnitz compresses may be employed; over the latter ice-bags may, if thought best, be laid, but not if sloughing is to be feared. For the rest, symptomatic treatment.

In traumatic erysipelas, injections of morphine may be made in the limiting zone of healthy skin; or applications of carbolic acid and turpentine.

Strengthening diet; antipyretics; quinine; salicylate of sodium; saline laxatives in case of sluggishness of the bowels.

PSEUDO-ERYSIPELAS. DIFFUSE PHLEGMONOUS DERMATITIS.

Local and general antiphlogistic treatment; subcutaneous injections of carbolic acid; mercurial ointment; incisions; antiseptics; strengthening diet.

DIPHTHERIA.

Prophylaxis.—Strict isolation from the sick; scrupulous avoidance of injury to the mucous membrane of the throat by pencilling, escharotics, etc.

Oertel's Treatment.—Rapid production of a limiting area of suppuration by means of hot vapor. The steam from a vessel of boiling water is conducted by means of a funnel into the patient's mouth every one-quarter to one-half hour (interrupting the sessions for not more than three or four hours during sleep) until the greater part of the membrane has been thrown off, then every hour, and later every two to four hours. Or a two-per-cent solution of salt or of chlorate of potassium may be applied by means of a steam atomizer. In addition antiseptic gargles (chlorate of potassium), or syringing (rough applications must be avoided) with permanganate of potassium solution (3 to 5:1,000), carbolic acid (one-half per cent), or thymol (one-half per cent in equal parts of alcohol and water). As a specific, chlorate of potassium is used in gargles and (very cautiously) internally.

Sublimate solutions, applied by careful swabbing, gargles, or spray inhalations, enjoy a great reputation; for children under two years the strength of the solution should be 1 grain to 6 ounces; between two and six years, 1½ grain to 6 ounces; over six years, 3 grains; and for adults, 6 grains to 6 ounces.

Large quantities of salt may also be applied to the diseased parts by means of the moistened back of the bowl of a dull-edged spoon. Or finely powdered sugar may be abundantly insufflated, and the throat syringed out frequently with a weak solution of common salt.

When the nasal cavity and posterior nares are invaded, the most careful cleansing must be made by syringing through the nostrils every hour or two by means of a conical-pointed syringe or the nasal douche, with lime water diluted with 2 parts of distilled water, or permanganate of potassium, or carbolic-acid solution, alternating with a one-and-one-half-per-cent salt solution or chamomile tea.

In laryngeal diphtheria, inhalations of fifteen minutes' duration, at intervals of fifteen to thirty minutes, of lime water, lactic acid, bromine, or carbonate of sodium or potassium; sulphate of copper as an emetic. Tracheotomy must be performed early, that is, before carbonic-acid poisoning has taken place; and then lime-water inhalations are to be given through the canula.

General Treatment.—Antipyretic and tonic (stimulant), strong wines (Burgundy, Port, Tokay), brandy (℥ i.–℥ iss. a day for children of three to four years) with syrup; tincture of chloride of iron; quinine as an antipyretic. In addition to the above enumerated remedies, are recommended—

External Remedies.—In the beginning, cracked ice taken very often; ice compresses, but also hot poultices worn day and night around the neck and covered with rubber tissue; inhalations of carbonate of lithium, bromine (or bromide of potassium); insufflations of sulphur; gargles with boric-acid solution; syringing or inhalation every fifteen minutes of lime water, or after each gargling from two to four teaspoonfuls of lime water internally; gargling with a five to ten per cent solution of common salt, and insufflation of 1½ to 6 grains of calomel once or twice a day; pencilling with pilocarpine solution, or with balsam of Peru thinned with alcohol and a little

oil of turpentine, and at the same time turpentine internally combined with yolk of egg or in emulsion.

Internal Remedies.—Salicylic acid, carbonate of potassium; a tablespoonful of a two-per-cent solution of bromide of potassium with a teaspoonful of chlorine water, every hour at first and later every two hours (first employed in scarlatinal diphtheria); cyanide of mercury, gr. $\frac{1}{8}$ to ℥ iv. water, a teaspoonful to a tablespoonful, according to the age of the patient, every hour; also local applications of the same in a solution of gr. $\frac{2}{3}$ to ℥ x. (both strongly recommended by Loeffler); a teaspoonful of oil of turpentine morning and evening, combined with inhalation continuously day and night of the following:

℞ Ol. terebinth.,
Tr. eucalypti,
Ac. carbolici, ... āā ʒ i.
Alcohol, ... ℥ x.
Aq. destillatæ, ... Oij.
M. S. For inhalation.

Diphtheritic paralysis is successfully treated with iron and electricity.

ASIATIC CHOLERA.

Prophylaxis.—Disinfection of the stools, body and bed linen, etc., of the sick with a carbolic-acid or, better, a sublimate (1:5,000) solution: moderate living; avoidance of anything that will in the least disorder digestion; attention to and treatment of even the slightest bowel trouble, such as flatulence, tendency to diarrhœa, etc.

Mild cases require rest in bed; keeping the body, and especially the abdomen, warm by means of Priessnitz compresses; a very simple diet, a little barley water, mucilaginous drinks, and red wine or brandy in boiled water. If the number of the stools increases, opium with bitters (for example, a teaspoonful several times a day of laudanum ℥ i., in compound tincture of cinchona ℥ x.) and 3 drops every two or three hours of strong muriatic acid in water; a dose of castor oil is to be given only in case of evident fecal accumulation or when the presence of undigested and decomposing food is suspected.

In the actual choleraic attack the cold surface of the body

must be wrapped up in warmed blankets, and be surrounded with hot bottles, heated sand-bags, etc. No food is to be taken, but from time to time small quantities of cold (rather than warm) or carbonated beverages may be given; or sometimes hot tea or coffee with brandy; hot poultices on the abdomen; and, if the stage of asphyxia has not already set in, opium in large doses (gr. ss.–i.) or laudanum (10 to 20 drops) every one to three hours.

Another mode of treatment is to rub the patient with a cloth, dipped in water below 59°, until the skin is markedly reddened, and at the same time two or three gallons of cold water are poured over the head every three or four minutes. The patient is then wrapped in warm blankets and placed in a warmed bed, hot bottles being placed at the feet and a cold compress, renewed every half-hour, on the abdomen. Fresh water may be taken to drink *ad libitum*. If sweating follow within three hours, then the rubbing is made with somewhat warmer water (64°) for the space of five minutes at intervals of three to six hours, and later every six to twelve hours.

For the cramps in the calves of the legs: rubbing with spirit of mustard or chloroform; brushing the skin; subcutaneous injections of morphine—this may be given as well for the vomiting, for which mustard plasters also are useful; iced Seltzer water.

In the stage of reaction: rest, diaphoresis. For diarrhœa, calomel with or without opium. For vomiting in this stage, morphine, mustard plasters, ice to the head.

A much-praised method consists in rectal irrigations of one to four pints of water at 100° to 104°, containing from 1 to 2½ drachms of tannin; the reservoir of the fountain syringe should be hung at a height of from six to ten feet. From three to six such injections are to be given, each time after a discharge from the bowels, in the twenty-four hours.

Heart weakness, with a small weak pulse, calls for subcutaneous injections of ether or of camphorated oil (℥ i.–iiss.).

On the theory that cholera patients die from the loss of water from the blood, and not from the intrusion of the cholera bacillus, some have given large injections of a one-and-one-half-per-cent solution of salt at the temperature of the blood, into the cellular tissue of an infra-clavicular fossa or beneath

the costal arch, and regard that as the only logical treatment.

CHOLERA NOSTRAS.

For the diarrhœa and vomiting of infants (acute gastro-duodenitis of bottle-fed children—summer diarrhœa—cholera infantum):

℞ Hydrarg. chlor. mitis, ... gr. i.
Cretæ præparatæ, ... gr. viij.
Sacch. albi, ... ʒ ij.
M. et div. in chart. No. 8. S. One powder every two hours.

In adults, with cramps in the legs and collapse: treatment the same as that for Asiatic cholera of mild form; extract of opium, gr. ⅓ to ½ every two hours. For children or adults: resorcin with castor oil; swallowing cracked ice; iced Seltzer water, but no fluids in large quantities; rest in bed envelóped in warm sheets; warm applications to the abdomen.

MALARIAL DISEASES.

Malarial Cachexia. Intermittent, Remittent, Pernicious Malarial Fever.

Prophylaxis.—Avoidance, as far as possible, of malarious regions, or while there of the damp, foggy morning and evening air; and also of gastric derangements, and great bodily and mental exertion; water should be taken only when mixed with wine; no watery fruits; quinine may have to be taken regularly as a prophylactic.

Treatment of the Attacks.—Quinine, preferably the hydrochlorate, never during the attack in the milder cases, but either in one large dose (ʒ ss. in wafers, with hydrochloric acid and water taken immediately after) at least six hours before the attack is expected, or the same dose in divided portions, beginning immediately after the subsidence of one paroxysm, so that it shall be all taken some time before the next one is due; in severer cases larger doses must be given; if the temperature rises again at the same hour of the next regular fever day, then the drug is to be repeated as before. If the attacks do not recur, the remedy is to be given in the same way but in half the dose on the seventh, fourteenth, twenty-

first, and twenty-eighth days. In cases of severe infection, 15 to 30 grains of quinine should be given daily in divided doses during the first and second weeks, and then once a week for the two following. In pernicious cases the remedy is to be given also during the attack.

In inveterate, irregular, and constantly relapsing cases, and in remittent neuralgia, Fowler's solution should be given for a long period in daily doses of ♏ viij.–xv., and half or full doses of quinine at the pyretic periods.

In all accompanying affections or sequelæ of malaria (leucocythæmia, enlargement of the spleen or liver, dropsy, etc.) quinine is of course to be given in suitable doses.

The new antipyretics have not proved to be of value in malarial fevers.

Among the more common domestic remedies are: Melilot; 5 drops of oil of turpentine and the same quantity of alcohol in tea or water; dried alum in two doses of gr. viij. each, taken three hours and one hour respectively before the attack is due.

INFLUENZA (GRIPPE).

Rest in bed, mild diaphoresis, and symptomatic treatment. For the adynamia, stimulating expectorants, and also quinine and wine; for the cough, narcotics, ipecac, and inhalations. In the last epidemic, antipyrine was found to be very useful. Lately salipirin has been recommended as better, given in doses of gr. xv.–xxx. (It is also of service in colds and coryza.) For the oppression, cutaneous irritants and mild laxatives. Tonics will be needed during convalescence.

AUTUMNAL CATARRH, HAY FEVER, HAY ASTHMA.

Symptomatic treatment by syringing out the nose with a one-per-cent quinine solution or (less strongly to be recommended) a 1:500 or 1,000 carbolic-acid or 1:500 salicylic-acid solution, about 45 grains of table-salt to the pint being added; a snuff of menthol, gr. ij. (or cocaine, gr. iss.) in ʒ i. each of roasted coffee and white sugar may be used; galvano-cauterization. Internally iodide of potassium is given.

The patient may escape the disease by a temporary sojourn in regions where it does not exist.

PERTUSSIS (WHOOPING-COUGH).

Prophylaxis.—Strict isolation of the sick from the well.

Hygienic Treatment.—Good, pure air, free from carbonic acid; being much in the open air; in stormy weather the atmosphere of the room should be impregnated with carbolic acid by means of a spray of a five-per-cent solution. Change of air, warm baths for one-half hour a day. Nourishing meat diet.

Internally.—Quinine in doses of gr. iss.–viij. several times a day; extract of belladonna, gr. $\frac{1}{12}$ to $\frac{1}{6}$ from three to five times a day; atropine very carefully in doses of gr. $\frac{1}{60}$ per day; bromide of sodium gr. xv.–xlv. a day; chloral; morphine (3 to 5 drops, two or three times a day, of morphine gr. i., in bitter almond water ʒ iiss.—but of course not for small children); expectorants, ipecac, pentasulphide of antimony; Ems water with boiled milk; bicarbonate of sodium with syrup of licorice; fluid extract of castanea.

Inhalations of a solution of salicylic acid; carbolic acid, bromide of potassium (one per cent); quinine (one and one-half per cent); 20 to 30 drops of a mixture of equal parts of turpentine and benzin poured on a sponge wrung out of hot water; one or two teaspoonfuls of a mixture of oil of turpentine (ʒ i.), chloroform (ʒ iij.), and ether (ʒ vi.) inhaled from a handkerchief. The throat and larynx may be pencilled with a ten to fifteen per cent solution of cocaine.

CROUPOUS (LOBAR) PNEUMONIA.

Diagnosis.—A high fever beginning with a severe chill in a previously healthy person; dyspnœa with cough and bloody sputum; bronchial breathing; dulness on percussion, usually over the right lower lobe; crisis usually on the seventh, sometimes on the fifth, day succeeding the chill.

The treatment is mainly symptomatic; a tolerably warm room; pure air; little conversation; not too cold drinks; usually only light broths; but in cases of great weakness a nourishing diet is called for, wine, especially in the weak and aged, strong broths, yolk of egg, milk, raw scraped meat, roast meat, etc., several times a day.

In case of high fever (above 103°), quinine in moderate doses or, less to be recommended, salicylate of sodium, antifebrin, antipyrine (none of these to be given shortly before the expected crisis); digitalis when the heart's action is weak and irregular. For the pain in the side, dry (only exceptionally wet) cups; morphine injections; Priessnitz compresses; baths at a temperature of 75° to 80°; cold baths only in strong individuals with a fever persistently remaining at 104° to 105.5°.

In symptoms of collapse, much wine, hot tea or coffee with brandy or rum, and subcutaneous injections of ether or camphorated oil.

In cases of circumscribed œdema of the lung with great dyspnœa, small pulse, beginning cyanosis, and prune-juice expectoration, in weak patients, dry or wet cups, or in extreme cases venesection to the amount of 6 to 12 ounces; in children a few leeches and ice applications; and in strong individuals a venesection is often of service. Withdrawal of blood must be accomplished with great caution, especially in children and the aged.

In painful, irritable cough an injection of morphine, and bicarbonate of sodium with morphine internally. When the sputum is tough and difficult to dislodge, expectorants are to be given.

℞ Ant. et pot. tartr., ... gr. $\frac{1}{8}$.
Sodii bicarb., ... gr. viij.
Syr. glycyrrh., ... ℥ ss.
Aq. destillatæ, ... ℥ iv.
M. S. A tablespoonful every two hours.

When there is also great weakness, infusion of ipecac with solution of anisated ammonia, or infusion of arnica with benzoic acid and syrup of senega.

In obstinate insomnia and tremor potatorum, chloral in doses of ℈ $\frac{3}{4}$–ij. preceded by a few drops of dilute hydrochloric acid.

When convalescence is tedious and resolution tardy, the diet must be of the most nourishing character, Priessnitz compresses are to be applied, and oil of turpentine given in doses of 10 to 12 drops from four to six times a day.

EPIDEMIC CEREBRO-SPINAL MENINGITIS.

Absolute quiet; good food; preservation of the heart's power; ice-bag to the head, but no baths. In cases of high temperature, quinine or some other antipyretic. For the severe pains, sleeplessness, and delirium, morphine, chloral; leeches behind the ears only in very severe cases. The formerly prized treatment by calomel and iodide of potassium in large doses, rubbing the shaved head with tartar emetic or mercurial ointment or applying blisters to the head, has with justice been abandoned as being useless if not harmful. Painting with iodoform-collodion (1:15) combined with the internal administration of iodoform in 3-grain doses would appear also to be useless.

DYSENTERY.

Isolation of the patient and disinfection of the discharges; rest in bed; warm applications to the abdomen; abstinence from all food in the beginning, later meat broths and peptone, bouillon with egg, barley-water, etc.

From time to time, when necessary, castor oil, rhubarb, or salines to empty thoroughly the intestine; and according to circumstances, and cautiously, an emetic. In cases of marked tenesmus, the rectum should be washed out three or four times a day with a one-half-per-cent solution of salt warmed to from 76° to 99° F., followed by a suppository containing 1 grain of opium. Opium may also be given internally if necessary.

Restoratives are to be given when called for; solution of anisated ammonia; camphorated oil or ether subcutaneously; punch, brandy, red wine, wine-soup.

TUBERCULOSIS.

Pulmonary Tuberculosis (Phthisis).

Tuberculosis is a disease caused by the presence of a specific micro-organism, the tubercle bacillus of Koch.

Prophylaxis.—1. Avoidance of breathing in the tubercle bacilli. The well should not live continuously in the room with the sick, nor sleep in the same bed with them; handker-

chiefs and other receptacles for expectorated matters should be treated with a 1:3,000 sublimate solution; clothing which has been worn by the sick should not be used by others, or at least not until it has been thoroughly disinfected.

2. The prevention of tuberculous inheritance by forbidding the marriage of those who are apparently inclined to tuberculosis, especially if they come from a family in which tuberculosis exists.

3. The power of resistance of the individual is to be strengthened, and any tendency to the disease removed, by a toughening and toning-up process.

In the case of poorly developed and poorly nourished youths, with flat and narrow chest, etc., as also of those who show signs of beginning pulmonary phthisis, cold frictions and cold douching for a few seconds. A good way is to pass a wet towel across the back, and rub with it energetically. But care must be taken not to cause too great a loss of heat, which, like too active exercise, tends to cause emaciation; and cold should not be used in the hectic stage. Deep respiration should be taken of fresh, pure, dust-free air. Exercise should be taken, but in moderation. A residence in the country or some climatic health resort will be of great service. The diet should be abundant and varied, for the purpose of building up the blood, and to a less extent the adipose tissue. Brehmer advises, when the digestion is good, fatty food with plenty of wine. Cod-liver oil is to be given, avoiding disordering the stomach; milk in abundance, and alcoholics. For the appetite, bitters, compound tincture of cinchona or bitter tincture, wine of cinchona.

As a specific, creasote (guaiacol) is recommended (see Part II.). In addition to that, a symptomatic treatment with as few drugs as possible.

Treatment of Fully-Developed Tuberculosis.—For the distressing cough: Seltzer water with hot milk; inhalations of a solution of salt or of bromide of potassium; morphine is to be given as sparingly as possible. For the bronchitis: Oil of turpentine in initial doses of 5 drops, gradually increased to 10 or 12 a day and continued for a long period. To loosen the expectoration: Inhalations of a salt solution; avoidance of cold drinks and raw, dusty air; keeping the body warm; pentasulphide of antimony, apomorphine, or the following:

℞ Ant. et pot. tartr., ... gr. $\frac{1}{6}$.
Sodii bicarb., ... gr. viij.
Syr. glycyrrh., ... ℥ ss.
Aq. destillatæ, ... ℥ iv.
M. S. A tablespoonful every two hours.

For high fever, a bath, of not too long duration, may be cautiously taken once or several times a day, the temperature of the water being from 75° to 85°; or if necessary, antifebrin, antipyrine, thallin, quinine, etc.; ice-bags over the heart and on the head; alcohol in moderate doses.

Profuse sweating: Sulphate of atropine, gr. $\frac{1}{60}$ in pill with licorice, at night; or hydriodide of hyoscine in doses of gr. $\frac{1}{120}$. Brandy (℥ iij.) taken at bed-time in cold milk has been highly recommended. Other remedies are, agaricin, sulphonal, hydrobromate of homatropine; cold sponging, powdering with salicylic acid and talc; sponging with vinegar. Sage tea is a favorite domestic remedy.

For the diarrhœa: Opium and acetate of lead or tannin, columbo.

For slight hæmoptysis (bloody sputa): Relief of the cough by morphine subcutaneously, at first in doses of gr. $\frac{1}{3}$ to $\frac{1}{2}$, and later gr. $\frac{1}{6}$, at most gr. i. in the course of the day; or

℞ Morph. hydrochlor., ... gr. iss.
Syr. prun. virg., ... ℥ i.
Aq. destillatæ, ... ℥ v.
M. S. A tablespoonful for a severe attack of coughing.

Morphine should, however, not be given when there is profuse hemorrhage. Extract of ergot by the mouth or subcutaneously.

For severe hemorrhage: Perfect quiet; ice-bags to the chest; cracked ice, and for the first attack a teaspoonful of salt in water repeated several times; inhalations of diluted solution of chloride of iron.

For vomiting: bromide of sodium or chloroform.

Acute Miliary Tuberculosis.

The treatment is purely symptomatic. For fever: antipyretics and local applications of ice. For cough and dyspnœa: morphine by the mouth and subcutaneously. For diarrhœa:

Opium with acetate of lead; easily digestible nourishing food, milk, chocolate, raw meat, raw ham, red wine.

Tubercular Meningitis (Acute Hydrocephalus).

For a consideration of the prophylactic measures, see under Pulmonary Tuberculosis.

In the beginning, before a diagnosis is definitely established, the treatment should be the same as for simple meningitis. When the diagnosis is certain, ice applications to the head; occasionally local abstraction of blood; quieting remedies (opium or chloral) as necessary; mild vegetable and saline laxatives; iodide of potassium in large doses up to the appearance of slight iodism; quinine; cold packing in fever, and cold douching in coma; stimulants, wine, musk.

PUERPERAL FEVER.

A whole series of morbid phenomena following septic infection in puerperal women: Ulceration, colpitis and endometritis, metritis, perimetritis and pelvi-peritonitis, parametritis, phlegmasia alba dolens, local or general symptoms of septic infection, or secondary affections of distant organs.

Prophylaxis.—Strict cleanliness and disinfection of the hands and instruments by means of solutions of carbolic acid, corrosive sublimate, or resorcin before and after every examination during labor or in the puerperal period; careful irrigation and disinfection of all wounds of the genitalia, and dusting the same with iodoform.

Treatment of the individual local affections above enumerated: The puerperal ulcers by means of carbolic-acid solution, tincture of iodine, or iodoform; the others according to the rules above given under the separate headings. For phlegmasia alba dolens: ice-bags, leeches, tincture of iodine, mercurial ointment, narcotics, mild laxatives. When peritonitis is present, leeches and ice applications to the abdomen. Calomel, gr. ij., with rhubarb repeated until there have been several soft stools.

The general symptoms are to be treated according to the indications presenting, by quinine, salicylate of sodium, acids, and good wine in generous amounts.

Venereal (Non-syphilitic) Diseases.

GONORRHŒA.

1. Gonorrhœa in the Male.

When possible, the patient should keep to his bed until the termination of the first stage, or in any case walk about very little. The diet should be as light as possible, with little salt or spices, no beer, and at most a small quantity of light wine; better only milk and water. A suspensory bandage should be worn, and the penis should be kept by means of a bandage with the dorsum resting against the abdomen.

In the acute inflammatory stage, milk and almond emulsion for drinking; ice-water compresses on the penis; mild laxatives; no astringent injections should be given, but thallin (1:100) has been recommended. For the pain on micturition (and for that caused by injections), a previous injection of a two-per-cent solution of cocaine may be given.

After the inflammation has begun to subside, injections may be carefully begun. The patient first urinates, injects about two teaspoonfuls of fluid, and allows it to flow out again immediately; then injects the same quantity again, and this time retains it in the urethra for from three to five minutes by compression of the meatus. This process is repeated from three to six times in the twenty-four hours, according to the severity of the case. The most commonly employed injections are: sulpho-carbolate of zinc in one-per-cent solution; sulphate of zinc, 2 to 5:1,000; alum, one per cent; tannic acid, ½ to 1 part in 100 of red wine; thallin, one per cent; acetate of zinc, 2:1,000; boric acid, three per cent; resorcin, 2:150; salol, 10 parts, gum Arabic, 5 parts, water, 200 parts; permanganate of potassium, 1:5,000; nitrate of silver, gr. ½ to i. in ℥ iij. The injections should never be irritating, and must be discontinued immediately upon symptoms of inflammation of the epididymis, prostate, or bladder.

After the inflammatory symptoms have disappeared (sometimes before), in addition to the injections, balsam of copaiba may be given in capsules in single doses of ♏ viij., up to ʒ ss.-ij. per day; or powdered cubebs in doses of ʒ v. a day (extract, ʒ i.); these two may be given separately or combined.

℞ Bals. copaibæ, ... 3 ij.
Pulv. cubeb., ... 3 iij.
Ceræ albæ, ... 3 i.
M. et div. in bol. No. 15. S. One bolus four times a day.

The best remedy for the painful erections is bromide of sodium, gr. xlv. dissolved in ℥ vi. of water, taken about five o'clock in the evening and repeated shortly before retiring. Or lupulin in 15-grain doses may be given.

In chronic gonorrhœa (gleet), injections may be used once or twice a day of sulphate of thallin, sulpho-carbolate of zinc, or sulphate of zinc in somewhat stronger solutions than those given above; and a pencil of thallin or a silver bougie dipped in glycerin may be introduced every second day before the injection; or a bougie dipped in iodoform-glycerin may be used instead of the injection to prevent stricture. A useful coating for a bougie may be made of sulphate of zinc, tannin, ergotin, or nitrate of silver (according to the special indications) in a stiff ointment of spermaceti, wax, and balsam of Peru; a bougie of small size is to be coated with this to about the thickness of a sheet of paper, and then introduced and left *in situ* for five or ten minutes. In hot weather, it should be laid on ice for a few minutes before being introduced. If it is desired to make an application to the neck of the bladder only, the eye of a catheter may be filled with the ointment. The method is serviceable in acute, but especially in chronic, gonorrhœa. In addition to the medicinal treatment, the genitals are to be bathed in cold water, or cold sitz or tub baths may be taken. The diet must be non-stimulating, without either beer or wine.

The abortive treatment of gonorrhœa consists in the employment of injections of a three-per-cent nitrate of silver solution or of sulphate of zinc in ten-per-cent solution, the root of the penis being pressed against the pubic arch to prevent the admission of any of the solution into the bladder. This is a very painful procedure and not to be recommended.

Gonorrhœal rheumatism is to be treated on general principles.

In cases of balanitis the glans should be kept perfectly clean and painted with a solution of nitrate of silver (gr. iv.–viij. in ℥ v.) or with sulpho-carbolate of zinc.

2. Gonorrhœa in the Female.

Perfect cleanliness. In the acute inflammatory stage cold sitz-baths and douches of cold water; and later, injections and internal remedies as in the disease in the male. The following method of treatment is to be specially commended: Twice a day, after cleansing of the vagina and vulva with pure water and pledgets of cotton dipped in cold water, a cylindrical speculum is introduced, then filled with any of the above-enumerated astringent solutions (in from three to five times the strength used for men), and at the end of a few minutes slowly withdrawn, a tampon with a string attached being introduced at the same time through it. The latter must be frequently renewed. Chloride of zinc and crude pyroligneous acid have been particularly recommended for injection by this method. Another method which has found considerable favor consists in swabbing out the vagina thoroughly with a 1:1,000 sublimate solution, followed by a liberal dusting with iodoform and the introduction of an iodoform tampon; this to be repeated in three or four days, and for two weeks thereafter irrigations with a 1:2,000 sublimate solution. (Instead of iodoform, calomel may be used, the vagina being previously moistened with a five-per-cent saline solution.) If the disease has spread to the uterus, continuous irrigations with a 1:5,000 to 2,000 sublimate or 1:50 carbolic-acid solution are useful, combined with an intra-uterine application of tincture of iodine or solution of chloride of iron.

Urethral gonorrhœa in the female is to be treated in the same way as the disease in the male, but care must be taken not to allow the injection fluid to enter the bladder; for this reason the medicated bougie is to be preferred.

PARAPHIMOSIS.

The prepuce is to be drawn forward by means of the index and middle fingers, firm pressure on the glans being made with both thumbs. If necessary, the constricting band must be divided. Cold compresses.

GONORRHŒAL ORCHITIS AND EPIDIDYMITIS.

To be treated in general like traumatic orchitis, the injections and administration of the balsams being discontinued.

ACUMINATE CONDYLOMATA, VENEREAL WARTS.

Cauterization with chromic acid, 1 part to 3 of water; corrosive sublimate, one to two per cent; or solution of chloride of iron: care being taken to protect the healthy portion from the action of the escharotic; frequent snipping off the growths with scissors, and subsequent cauterization; dusting the moist surface with powdered savine; or destruction with the Paquelin or galvano-cautery.

SOFT CHANCRE, CHANCROID.

A purely local affection which appears immediately or within four days after exposure to infection. From this time until the eighth day abortive treatment may be successful. This may be accomplished with the Paquelin or galvano-cautery, or by means of deeply acting caustics, such as sticks of chloride of zinc, gr. xv., and nitrate of potassium, gr. v., melted together; caustic potassa, which, however, makes a hard cicatrix; or nitrate of silver. After the cauterization the patient should remain in bed, with the organ elevated, and use cold applications.

Subsequently, or if the abortive treatment is not employed, the patient should keep to the bed, bathe frequently in a tepid one-half to one per cent saline solution, use cleansing injections under the prepuce, and powder the ulcers with iodoform. A low diet is indicated.

For gangrenous ulcers, warm compresses wet with camphorated wine are to be used, and the parts are to be dusted with iodoform. Diphtheritic ulcers are to be covered with compresses dipped in a warm one-per-cent saline solution and also dusted with iodoform.

ACUTE BUBO.

The most certain preventive of a bubo is energetic, but not irritating, treatment of the soft chancre. When it appears, it is to be treated by applications of ice, tincture of iodine, or solution of chloride of iron, the patient keeping in bed. If, despite this treatment, the bubo continues to increase, hot poultices frequently renewed are called for; and as soon as fluctuation appears, the pus must be evacuated by the aspira-

tor or by small incisions, light pressure being made. If suppuration is extensive, a free opening must be made and a tampon of iodoform gauze inserted; disinfection may also be accomplished by means of solutions of carbolic acid or chloride of zinc, and dusting with iodoform or salol. Any exuberant growths are to be touched with nitrate of silver. The diet should be low, and mild laxatives may be called for.

Syphilis.

Indurated, hard, or Hunterian chancre. Indolent syphilitic bubo. Syphilis of the skin and mucous membranes, of the bones, nerves, brain, and internal organs.

Local Treatment.—Thorough excision of the initial sore, and cauterization of all erosions and ulcerations with the solid stick. Successful results from this treatment are uncertain.

General Treatment.—"Hunger cure," a diet of milk and white bread with at most a little broth, lean meat, vegetables, and fruit, but no fats and no alcohol. "Sweating cure," by drinking linden-flower or wood tea while wrapped up warmly in blankets. Inunctions with mercurial ointment. Internally: mercury, iodide of potassium or of iron, sarsaparilla, sassafras, Zittmann's decoction, jaborandi. Parenchymatous injections of calomel. Sulphur baths. Russian baths.

CONGENITAL OR HEREDITARY SYPHILIS.

Calomel, gr. $\frac{1}{6}$ a day; or corrosive sublimate cautiously administered in a daily dose of gr. $\frac{1}{12}$ in divided portions; mercury with chalk. Inunctions of gr. v.–viij. of mercurial ointment every second day, after a warm bath, provided the infant's skin will tolerate it, and if there are no cutaneous ulcers present. Sublimate baths (℥ ss. to the bath) at the temperature of the body. Iodide or pyrophosphate of iron. Nourishing food, preferably mother's milk.

Infection from Animal Poisons.

HYDROPHOBIA, RABIES, LYSSA.

The immediate application of a ligature about the wounded limb, thorough washing of the wound, sucking by means of cups or the mouth, and fomentations with salt water, until it is possible to cauterize with the hot iron, Vienna paste, car-

bolic acid, or caustic potassa. If a scar has formed, it must be excised and the wound kept suppurating for months. The person who has been bitten must be reassured as far as possible and made to believe that no evil consequences will result.

When the disease has already appeared, there is little to do except to treat the symptoms as they arise. Everything that may excite the patient, such as noises, light, and an attempt to drink, must be avoided. In robust individuals a venesection may be of service. Enemas may be given of bromide of potassium, and also of cold water as a cooling measure. Morphine subcutaneously; chloral. The following is said to have effected a cure:

℞ Curare, ... gr. ss.
Glycerini,
Aq. dest., ... āā ♏ xlv.

M. S. Fifteen minims hypodermically every three or four hours.

Arsenic is also recommended, given in doses sufficient to produce slight toxic symptoms.

GLANDERS, MALLEUS.

Thorough destruction, if possible, of the poison *in loco*, by nitric or carbolic acid (the latter also subcutaneously), etc. Early opening of the boils. Compresses of chlorine water or carbolic-acid solution. Injections of creasote solution in the nose. Internally, in acute cases, laxatives, quinine, muriatic acid; in chronic cases, iodide of potassium. Nourishing food, wine.

TRICHINOSIS.

The treatment is chiefly symptomatic. In recent cases, emetics and cathartics. In muscular trichinosis, a nourishing diet is called for; antiphlogosis by means of salicylic acid, quinine, cold applications; morphine injections or chloral for the pain. Glycerin is recommended for the destruction of the trichinæ, and also ergotin, benzin, and naphthalin.

MALIGNANT PUSTULE, CHARBON.

Thorough cauterization by means of Vienna paste, the actual cautery, equal parts of chromic acid and water, carbolic or nitric acid, or cantharidal ointment, followed by the

application of an antiseptic dressing. A still better plan is to excise the diseased parts and then cauterize.

A few large doses of calomel should be given, and then large doses of quinine with hydrochloric acid. Tonics are indicated.

IX. SKIN DISEASES.

Anomalies of Secretion.

SEBORRHŒA.

The crusts are to be softened and removed by rubbing in oil, lard, vaselin, or best one part of glycerin to four of water or alcohol, and then covering the parts with a piece of flannel soaked in the same substance used for rubbing, and leaving them covered for twelve hours. This is to be repeated three or four times, and then the parts are washed off with warm water and soap. After this, soft soap is rubbed in three times a day for three days in succession; or, when the hair is long, the tincture of green soap may be used.

If eczema is produced, stop the rubbing, but leave the soap on for three days, then wash off, and two days later apply rose-water ointment.

To prevent a recurrence of the disease the parts should be washed twice a day with a five-per-cent alcoholic solution of chloral, or carbolic acid (1 : 1,000), or a ten-per-cent tannin ointment. The following is to be used when the hair is falling out:

℞ Tinct. cantharidis, ... ʒ ss.
Ext. cinchonæ, ... ʒ i.
Ol. rosmarini, ... gtt. x.
Medull. bovis, ... ʒ i.
M.

In seborrhœa of the genitals, the parts may be washed three times a day with a one-per-cent carbolic-acid solution, and afterward dusted with some indifferent powder.

COMEDONES, ACNE.

In comedones and simple acne (suppuration of the sebaceous glands), the parts are to be rubbed several times a day with a cold, damp, rough woollen cloth, the comedones being

previously pressed out with a watch-key, and in the evening an application of tincture of green soap, solution of caustic ammonia, ichthyol, naphthol, iodide of potassium, or equal parts of precipitated sulphur, alcohol, and glycerin.

In acne indurata, the hard papules may be destroyed by rubbing with an ointment of iodide of sulphur, gr. viij., in lard. ʒ ss. (prepared fresh every day), or a lotion of 1 grain each of corrosive sublimate and chloride of ammonium in 6 ounces of bitter-almond water.

In acne rosacea occurring in drinkers, the amount of alcohol must be reduced. The pustules are to be scarified and the protuberances scraped out; or they may be cauterized three times a week with carbolic acid and alcohol (1:3). Here also may be used the corrosive sublimate lotion or sulphur ointment, above given; but ichthyol is especially commended.

SWEATING OF THE FEET.

Washing several times a day with soap or diluted alcohol, and frequent changing of the stockings. The feet are carefully washed and then oiled and covered with linen spread with a thick layer of diachylon ointment; this is to be done every day for two or three weeks. The stockings are dipped in a bowl of water containing 1 or 2 ounces of tartaric acid, then dried and ironed; or salicylic acid with talc, or plain starch, is dusted into the stockings. Tannin soap. Lukewarm foot-baths twice a day with borax soap, followed by the application of a lotion of permanganate of potassium (about 1:200). Acetate of aluminum. Painting with a one-per-cent chromic-acid solution.

Acute Inflammations of the Skin.

ERYSIPELAS.

See Infectious Diseases.

ERYTHEMA EXUDATIVUM MULTIFORME.

No treatment, or at most a constitutional symptomatic one.

Cold lead-water compresses, with removal of any sources of irritation. In the case of erythema nodosum of the lower extremities, the legs must be kept in a horizontal position.

INTERTRIGO.

Scrupulous cleanliness, cold lotions, baths. Diarrhœa, when present, must be checked. Astringent drying ointments with tannic acid or subnitrate of bismuth and glycerin, equal parts, or oxide of zinc in powder. If ulcers form they are to be treated with nitrate of silver. Fomentations three times a day for an hour at a time with corrosive sublimate solution (1:2,000). Diachylon ointment with olive oil. Separation of the opposing surfaces with a wad of salicylated cotton.

Cleaning with Unna's superfatted soap.

The following drying powders are to be used only when the epidermis is intact: carbonate of magnesium, lycopodium or starch with $\frac{1}{5}$ part of oxide of zinc, tannin, salicylic acid with talc.

URTICARIA, NETTLE RASH.

For the acute form, cold douches or lotions of vinegar and water (1:3), or nitric acid 3 ss. to ten quarts of water; citric acid (rubbing the skin with lemon), alcohol, Cologne water; washing the skin with elder tea, and then dusting with a powder of camphor and oxide of zinc each 1 part, starch 20 parts. Ichthyol vaselin. For the itching, $\frac{1}{6}$ grain of morphine subcutaneously. Saline laxatives.

In the chronic form, arsenic in doses of gr. $\frac{1}{12}$ to $\frac{1}{6}$ a day, or atropine $\frac{1}{60}$ gr. to $\frac{1}{30}$ a day; aconite in small initial doses gradually increased; salicylate of sodium in doses of gr. xxiv. three times a day with aconite, and ichthyol externally. Cups frequently applied; mustard foot baths; lotions of 1:2,000 of corrosive sublimate. Frequently nothing relieves.

Fatty food, milk, shell-fish, etc., are to be avoided.

HERPES.

The vesicles and inflamed portions of the integument should be covered with cloths spread with vaselin, or dusted with lycopodium or starch; flexible collodion, mild ointments, or lotions of lukewarm lead water may also be used.

Herpes genitalis (on the prepuce, glans penis, labia, or mons Veneris) is to be treated with sheet lint wet in lead water or spread with zinc ointment.

In herpes zoster, an ointment composed of extract of belladonna 5 parts, in lard 30 parts, may be serviceable; morphine may be used subcutaneously or in the form of ointment; non-irritating plasters containing extract of opium; vaselin, flexible collodion. (See also Neuralgia.)

FURUNCLES AND CARBUNCLES.

In the beginning, tincture of iodine, mercurial ointment, ice; emollient plasters, poultices, Priessnitz compresses; iodoform, iodol. Early opening after previous congelation with ether spray.

Habitual furunculosis: A teaspoonful in sweetened water twice a day of arseniate of sodium gr. iss., in water ℥ vi.; after this amount has been taken, a saline laxative is to be given, and then in a short time the arsenic is to be resumed. In addition, fresh herb juices or decoction of sarsaparilla may be given, followed later by a grape-cure.

Subacute and Chronic Inflammations of the Skin.

ECZEMA.

Correction of all nutritive disturbances by means of a suitable diet and treatment, and attention to any constitutional vices. Arsenious acid is to be given internally, and all mechanical or chemical sources of cutaneous irritation must be avoided. Dry crusts must be removed by gentle but thorough swabbing with cotton dipped in olive or almond oil. If the previously excoriated parts are cicatrized and the eczema in process of healing, the parts are to be cleansed with water and superfatted soap; the more severe cases with tannate of sodium soap with or without the addition of oxide of zinc. Moist eczema is to be treated by applications of Lassar's paste, the amount varying according to the severity of the case, spread on sheet lint and frequently changed. The parts must be cleansed with oil and superfatted soap.

℞ Zinci oxidi,
Amyli, ... āā ℥ iij.
Acid. salicyl., ... gr. xv.
Vaselini flavi, ... ℥ vi.
M. et ft. unguentum. S. Lassar's paste.

Acute eczema calls for expectant treatment with indifferent applications, drying powders, or bland ointments.

Simple eczema of the face (crusta lactea of infants): Applications of a greasy zinc ointment; or preferably of sublimate solution (gr. $\frac{1}{12}$ to $\frac{1}{6}$ in water ʒ iss.). If this is not well borne, the parts should be liberally powdered with oxide of zinc.

In cases of very extensive eczema: Local shower-baths at a temperature of from 57° to 66°; sublimate baths (ʒ iiss. to the tub); or avoidance of all water, the body being enveloped in linen cloths dipped in olive or cod-liver oil. Applications of ointments of birch-tar oil or tar; or the following:

℞ Camphoræ, ... gr. xv.
Acidi tannici,
Hydrarg. ammoniati, . . . āā ʒ ss.
Adipis, ... ʒ iiss.
M. et ft. unguentum.

Small places obstinate in healing are to be touched with nitrate of silver, acetic or chromic acid. Internally tinctura calladii seguini (an expensive proprietary remedy) in 15 to 20 drop doses three times a day has been highly recommended.

On the hairy portions of the skin a lotion of one-per-cent boric-acid solution or boric-acid ointment (boric acid and olive oil each 1 part, and lanolin 9 parts) may be used.

If the skin is no longer moist, but is thickened and covered with crusts, it should be covered with strips of linen spread with Hebra's diachylon ointment, or with zinc, ichthyolate of zinc, or carbolate of lead mull. In mild cases superfatted ichthyol soap may be used, the lather being allowed to dry on the skin; in severer cases, the skin being no longer moist, but thickened, hyperæmic, and covered with scales, equal parts of tar and cod-liver oil may be applied. In very obstinate cases, the skin being thickened and sometimes also moist, tincture of green soap is to be applied; or long rubbing with soft soap and painting with solution of caustic potassa (1 part to 2 of water); and after the crusts are removed, rubbing with the hand or a soft flannel dipped in water; finally covering the parts with one of the above-mentioned plaster mulls. Alcohol may be used to relieve the itching.

As an aid in the treatment, the baths of Kreuznach, Ems, or Leuk, or carbonic-acid baths may be employed. After a cure

has been effected, a course of the waters at Friedrichshall or Mergentheim will be useful.

ECZEMA MARGINATUM.

See below, under Parasitic Skin Diseases.

PEMPHIGUS.

Bran baths, Priessnitz compresses; boro-vaselin (1:50); carbolic-acid dressings; enveloping in salicylated cotton; touching with nitrate of silver. Tonics, and quinine when there is fever.

For syphilitic pemphigus, mercury must be given.

RUPIA.

Softening applications to the crusts; touching the base of the ulcers with nitrate of silver. Antisphilitic remedies or tonics.

MENTAGRA, SYCOSIS.

Softening of the crusts by poultices; epilation; application of pieces of flannel thickly spread with Hebra's diachylon ointment, left on the skin for twelve to twenty-four hours; green soap (solution of caustic potassa 1 part, lard 2 parts); precipitated sulphur with equal parts of alcohol and glycerin; red or white precipitate ointment. In obstinate cases, cauterization of the epilated parts with acetic or carbolic acid, chloride of zinc, or caustic potassa in stick. As an after-treatment an ointment of equal parts of precipitated sulphur, alcohol, and glycerin may be applied at night.

IMPETIGO AND ECTHYMA.

These are not, properply speaking, independent skin diseases, but are the accompaniments or results of other affections, such as eczema, and are more commonly caused by scratching.

The hair is to be cut short and the crusts softened by oil. After removal of the crusts, an ointment of calomel (4 parts to 30) or nitrate of mercury (1:20) should be used, and the ulcers touched with nitrate of silver.

The cachexia is to be treated by tonics and cod-liver oil with iron.

In syphilitic ecthyma, mercurials are indicated.

PITYRIASIS.

Pityriasis Simplex.—Washing with tincture of green soap, followed by a thorough inunction with some oil or fat that will not become rancid. An application may be made every evening of borax 3 ss. in lard ʒ i., which is to be washed off in the morning with a one-per-cent solution of carbonate of potassium. Or an ointment may be used of sublimed sulphur 5 parts, in lard 30 parts. A favorite domestic remedy consists in rubbing the scalp energetically with yolk of egg and then washing off with tepid water; the hair should be previously cut close.

Pityriasis Versicolor.—The treatment is very tedious, but a cure may be finally obtained by thorough rubbing with green soap and alcohol repeated at regular intervals for a long period of time. Also by means of an acoholic sublimate solution, 1 part of corrosive sublimate to 1,000 of fifty-per-cent alcohol.

Pityriasis Rubra.—The disease is very obstinate, running along for years, yet may sometimes be favorably influenced by the internal addministration of arsenious acid or carbolic acid.

PSORIASIS.

Internal Remedies.—Fowler's solution, 5 drops a day for the first week, increasing by 1 drop every week up to 10 drops a day, then decreasing at the same rate. Or the following may be given:

℞ Acidi arseniosi, ... gr. i.
Opii pulv., ... gr. iij.
Saponis, ... q.s.

M. et ft. pil. No. 16. S. One pill morning and evening after meals.

Arsenic must not be given in case of diarrhœa or dyspepsia. The diet must be plain, and alcohol is to be avoided.

External Treatment.—Twice a day Priessnitz compresses are to be applied for three hours at a time, active diaphoresis

being maintained, and followed by a brief cold bath. Oil of cade or birch-tar oil is to be rubbed in once or twice a day, the scales and remains of the former application being previously removed by tincture of green soap, pumice stone, or a protracted bath with soap and warm water. After each application a sweat should be taken of several hours' duration in blankets. Instead of the tar, a five to twenty-five per cent chrysarobin ointment may be applied, after removal of the scales (care being taken to protect the eyes), then an eight to ten per cent pyrogallic-acid ointment or solution; this is, however, not without danger when used in large quantities.

Green soap may be applied twice a day for six or eight days, the individual spots being specially rubbed, the patient remaining in bed well covered up in blankets; a bath is to be taken a few days later, after desquamation has taken place.

When the disease is of slight extent, green soap may be applied like an ointment on a piece of flannel; the parts may be painted with a 1:1,000 solution of corrosive sublimate in equal parts of alcohol and water; cantharidal collodion may be applied; the spots may be touched with nitrate of silver in stick; an ointment of white precipitate (1:25) may be applied twice a day, or 1 part of carbolic acid to 10 parts of flexible collodion; or finally resorcin.

In syphilitic psoriasis, mercurials are indicated.

Of mineral-water baths, those of Aachen or Kreuznach may be recommended.

ICHTHYOSIS.

The condition may be improved by rubbing with soft soap followed by alkaline baths; arsenic internally.

LICHEN.

Lichen Scrophulosorum.—Cod-liver oil in daily doses of ℥ ss. for children, ʒ i.–1j. for adults, combined with inunctions of the same twice a day, the patient wearing close-fitting flannel underclothing. The constitutional trouble must be treated.

Lichen Ruber.—Arsenic is to be given until every trace of the disease has disappeared. Externally, corrosive sublimate or carbolic acid is to be used. The diet should be nourishing.

Lichen Syphiliticus.—Mercurial inunctions. Zittmann's decoction. Syphilitic treatment.

PRURIGO.

Arsenic internally.

The diseased parts should be rubbed with green soap or with the Wilkinson-Hebra ointment:

℞ Sulph. loti,
Ol. fagi, ... āā ℥ ss.
Sapon. viridis,
Adipis, ... āā ℥ i.
Cretæ, ... ℥ iiss.
M. et ft. unguentum.

At the same time the patient should take a long sweat in blankets every day for six days, and should repeat it frequently, even after desquamation has occurred. Or Vlemingkx's solution may be applied to the affected parts daily by means of a sponge, to be followed in a few minutes by a bath of one or two hours' duration; after this a five to ten per cent chloral ointment or cod-liver oil is to be used, and the patient enveloped in linen sheets. Vlemingkx's solution is made by mixing together 12 drachms of sublimed sulphur and 5 drachms of quicklime in 10 pints of water, boiling down to 6 pints and then filtering. If the skin is sore, warm baths containing 3 to 6 ounces of the solution are to be employed.

The causes are of course to receive appropriate treatment: these are: parasites, other skin diseases, or general affections, such as diabetes, uræmia, cholæmia, etc.

Another method is to paint the entire body every day with a mixture of 1 part of chloroform and 4 parts of birch-tar oil, followed by a tub-bath of several hours' duration; sulphur; soaps containing tar, creasote, or carbolic acid.

A more rapid method is said to be rubbing the body several times a day with cod-liver oil, combined with the persistent use of bromide of potassium internally.

℞ Hydrarg. ammoniati, ... ℥ ss.
Camphoræ, ... ℥ i.
Adipis, ... ℥ i.
M. et ft. unguentum. S. To be applied once a day.

In conjunction with this, warm baths are to be used, a strict diet ordered, and frequent purging with calomel gr. v., and jalap gr. viij.

The baths of Aachen, Kreuznach, etc., may be tried.

PRURITUS.

Carbolic acid may be given internally in doses up to gr. vij. a day, and lotions of the same externally in the strength of 1.5 even up to 10%.

℞ Acidi carbolici, ... gr. lxxv.
Pulv. glycyrrh.,
Ext. glycyrrh., ... āā gr. xlv.
M. et ft. pil. No. 100. S. Two or three pills three times a day.

Bromide of sodium, Fowler's solution, atropine, quinine, or pilocarpine may also be tried. Palliative measures are: Cool baths, douches with or without the addition of alum, soda, corrosive sublimate, Vlemingkx's solution, etc.; rubbing with sliced lemon, alcohol, Haller's acid elixir, Cologne water, two to four per cent chloral solution.

Pruritus vulvæ, vaginæ, or ani: Local baths, lotions of weak alcoholic or aqueous solutions of carbolic or salicylic acid; painting with cocaine solution; injections, tampons, or suppositories containing tannin, alum, or zinc in one-per-cent strength; inunctions with boric-acid ointments containing cocaine (3 to 5 parts in 200), with five to ten per cent chloral, or five-per-cent ichthyol ointment. When the itching is excessive, narcotics must be used.

Pruritus senilis: Sponging the body with water at 120° F., containing aromatic sulphuric acid, followed by powdering with salicylate of bismuth 1 part, and starch 4 parts.

BURNS.

First degree (redness): Application of cold, fomentations with alcohol; petroleum. Second degree (vesication) and third degree (scab formation): Opening of the blisters; application of equal parts of lime water and linseed oil; dusting with finely powdered bicarbonate of sodium covered with a damp cloth, or with gum Arabic, or the application of flexible

collodion in order to form a soft and permanent protection to the parts. Lister's dressing, spray, boric ointment on linen, carbolized gauze or salicylated cotton, covered with a mackintosh protective. Nitrate of silver applied once a day; iodoform; sulpho-ichthyolate of zinc.

Irrigation and the continuous bath; oil baths; wrapping with cotton, which is to be renewed only when it is moistened with the discharges and is easily removable.

FROST-BITES.

First degree: Cold compresses at first; rubbing with snow; lead lotions. Second and third degrees: Simple treatment of the ulcers by nitrate of silver ointment (gr. i.: ʒ i.); removal of the eschars; possibly amputation of the limb.

In chronic cases (pernio), characterized by blood-stasis, serous and plastic exudation: Pressure by strips of adhesive plaster, rubbing with ointments; frequent applications of nitric-acid solution (♏ xv.: ℥ i. cinnamon water); nitrate of silver, tincture of iodine, flexible collodion, camphor; zinc ointment, balsam of Peru, oil of turpentine; powdered tannin on the moist skin, chloride of calcium, ichthyol.

Subcutaneous injections of ergotin (in frost-bite of the nose, the injection may be made in the upper third, where a fold of the skin may be raised). Painting with glue; superfatted soap; sulpho-ichthyolate of zinc.

ALOPECIA.

Etiology.—Heredity, constitutional diseases, long-continued irritation or disease of the scalp or of the nerves of the scalp.

Prophylaxis.—When necessary, suitable tonic treatment and care of the hair, with sufficient greasing.

Treatment.—For simple alopecia, painting the scalp with alcoholic solutions, such as the following:

℞ Tinct. benzoin., ... ʒ ss.
Ac. salicylici, ... gr. xv.
Sp. vini gallici, ... ℥ vi.
M. S. Hair tonic.

℞ Tr. aconiti, ... ♏ xv.
Bals. peruv., ... ♏ xlv.
Sp. vini gall., ... ℥ vi.
M. S. For external use.

At the same time one of the following pomades may be used:

℞ Quin. tannatis, ... gr. xv.
Ung. aq. rosæ, ... ʒ xij.
M. et ft. pomatum.

℞ Tr. cantharidis, ... ʒ ss.
Ol. rosmarin., ... gtt. x.
Ext. cinchonæ, ... ʒ i.
Medull. bovis, ... ℥ i.
M. et ft. pomatum.

In pityriasis capitis (dandruff), the scalp should be plentifully greased in order to soften the scales, then scrubbed with a brush and green soap, washed off with first tepid, then cold water, dried, and again oiled, the oil being allowed to remain for twenty-four hours. The following method is strongly recommended: For a week the head is washed daily with green soap, rinsed with cold water, dried, anointed with a 1:10 pyrogallic-acid ointment, and covered with a flannel cap; twice during the following week the head is washed in the evening with green soap and oiled thoroughly the following morning; and after this for several months the following hair wash is used:

℞ Acidi salicyl., ... ʒ i.
Glycerini, ... ʒ iv.
Sp. vini. gall., ... ʒ xx.
M. S. For external use.

PIGMENT SPOTS AND FRECKLES (PITYRIASIS VERSICOLOR).

A compress met with a sublimate solution (1:1,000 or at the most 1:200) is applied for two hours a day, followed by cold compresses to reduce the swelling of the face caused thereby. Sulpho-carbolate of zinc. Thorough application of Vlemingkx's solution (*conf.* Prurigo). Painting three or four times a day with tincture of iodine. Applications of precipitated sulphur made into a paste with acetic acid. Sublimate collodion; resorcin; carbolic acid.

New Growths.

LUPUS.

The tubercles are to be thoroughly destroyed with caustic potassa in stick; or scraped out with the sharp spoon and then energetically cauterized. The indurated parts are punctured and this is followed by applications of equal parts of chloride of zinc and alcohol, and cold compresses; when the scab falls off in eight or ten days, the procedure is to be repeated—from five to eight times in all. Or an application may be made of equal parts of iodine, iodide of potassium, and glycerin. Later, emplastrum hydrargyri should be applied for a long period. Ice-bags may be applied continuously in the endeavor to destroy the bacilli. Subcutaneous injections of tuberculin (?). Assistance may be derived from the use of cod-liver oil, arsenic, and saline baths.

LUPUS ERYTHEMATODES.

Mercurial plaster. Rubbing with tincture of green soap. Then white precipitate ointment (equal parts of white precipitate and subnitrate of bismuth in 10 parts of ointment), and cauterization every third day with equal parts of caustic potassa and water, fuming nitric acid, carbolic acid, or caustic glycerin-iodine. Repeated punctures followed by dusting with iodoform. Lately it has been recommended to apply pyrogallic acid (1:10 vaselin) spread on linen, and allowed to act for three or four days until a scab is formed, then to powder with iodoform and cover with iodoform gauze.

Internally, cod-liver oil, arsenic, and iron may be given.

Infectious Skin Diseases.

SCABIES.

Balsam of Peru; storax, copaiba; petroleum; benzin; carbolic acid; Vlemingkx's solution (*conf.* Prurigo). The last-named four preparations may excite a mild eczema, and carbolic acid may cause dangerous symptoms. Other remedies are green soap and creasote.

FAVUS.

When the disease affects the hairy parts, the crusts are to be softened and removed by means of oil; epilation must be practised, then the parts are washed with tincture of green soap and afterward painted with a 1:1,000 sublimate solution, or anointed with a five-per-cent pyrogallic-acid ointment or with five to ten per cent carbolized oil. When on the non-hairy parts, the crusts should be removed by mechanical means and the parts rubbed with green soap. Favus of the nails is to be treated by sublimate solution after removal of the diseased nails by scraping and cutting.

HERPES TONSURANS.

Epilation and application of parasiticides as in favus. The following method has been strongly recommended: The hair on the diseased patches or on the entire head should be closely clipped, and then, the forehead and neck being protected by a cloth wrapped around them, oil of turpentine is poured on the head and carefully rubbed in with the fingers; as soon as the pain has subsided (in about three minutes), the head is shampooed with carbolic soap and washed off with an abundance of warm water; after this the parts are painted every day with one or two coats of tincture of iodine or a two-per-cent solution of iodine in oil of turpentine. A cure is usually obtained within a week.

ECZEMA MARGINATUM.

This is caused by the same parasite as the preceding, and occurs on the contiguous surfaces of the scrotum and thigh, between the nates, on the genitals, and in general wherever two moist surfaces of integument come against each other.

The treatment consists in washing with one-per-cent boric-acid solution; rubbing with green soap, followed by oleum rusci; compresses of green soap; applications twice daily of Wilkinson's ointment (*conf.* Prurigo); alcoholic solution of carbolic acid; tar; oil of turpentine. In eczema marginatum of the thigh and scrotum, the latter should be supported in a suspensory bandage.

SYCOSIS PARASITICA.

See Mentagra.

X. POISONING.

Acute Poisoning.

The acute action of a poison is either purely local, consisting in the chemical or irritant effect of the substance upon the parts with which it is in contact; or systemic, due to the specific effect, upon the nervous centres chiefly, of the substance after its absorption; or finally a combination of the two.

The aim of treatment is to weaken the caustic action of the substance by dilution and neutralization, and then to effect its removal as quickly as possible from the gastro-intestinal tract by means of the stomach-pump, emetics, and cathartics; or else to introduce substances which will form insoluble or non-toxic chemical combinations with the poison. In either case, however, the removal of the toxic agent must be accomplished.

If the poison has been taken into the circulation, the attempt to neutralize it would appear to be seldom of any use (see, however, Gaseous Poisons, Sulphuretted Hydrogen); still, transfusion after a copious venesection may be of service, especially in poisoning by gaseous substances.

The action of many poisons upon certain definite portions of the nervous system may be overcome by the administration of substances having the opposite effect (antidotes); this is especially the case with alkaloidal poisons, yet the antidotal alkaloid must never be given in doses which are of themselves lethal. In other cases the treatment must be symptomatic: Stimulants in case of collapse; venesection in marked cerebral congestion; artificial respiration, and sometimes the use of oxygen, in poisoning by hydrocyanic acid, strychnine, and gases.

The *sequelæ* of poisoning by irritant and caustic substances are acute inflammation, especially of the primæ viæ, the formation of eschars, sometimes perforation, and hemorrhage.

Conf. Toxic Gastritis.

A. Solid and Liquid Poisons.

I. INORGANIC POISONS.

1. Poisoning with Escharotic Mineral Acids.

Symptoms.—Cauterization of the mucous membrane of the mouth and throat, distressing cough, vomiting of membranous (and bloody) masses, severe colic, tenesmus, bloody stools, or sometimes obstinate constipation, collapse.

Treatment.—Dilution of the acid and protection of the walls of the stomach by copious draughts of water and mucilaginous drinks (barley water, flaxseed tea) milk, oil; neutralization by means of chalk, lime water, carbonate of magnesium or calcined magnesia, the latter being stirred up in about 20 parts of water of which two tablespoonfuls may be taken every fifteen minutes at first, and afterward less frequently; if necessary, any other alkalies may be taken, such as ashes, soap-suds, etc. Vomiting usually occurs without the need of an emetic, and indeed may be so persistent as to require the use of ice, carbonic-acid water, or opium to control it.

2. Poisoning with Metals, Metalloids, and their Combinations.

ALKALIES AND EARTHS.

Symptoms.—Burning in the mouth and throat, and cauterization of the mucous membrane; vomiting and discharge from the bowels of blood; severe headache, syncope, and collapse.

Treatment.—Poisoning with non-caustic potassium salts calls for stimulants; with the nitrate, after the production of vomiting, protective remedies such as albumen and opium.

Concentrated caustic alkalies call for dilution, neutralization, and saponification by means of large quantities of vinegar, lemon juice, fats, and oils.

Chromate of potassium (caustic): carbonate of magnesium bicarbonate of sodium, or a thin gruel of iron powder and syrup.

Caustic earths, quicklime: Carbonic-acid water, cold sugar-water (used especially by masons for washing the eyes when any lime has splashed into them); vinegar, the alkaline carbonates, fixed oils, eggs, vegetable acids.

Baryta and its salts (causing inflammation of the stomach,

vomiting, pain in the epigastrium, headache, dimness of vision, syncope, convulsions): Albumen, sulphate of sodium, potassium, or magnesium (to form an insoluble sulphate of barium); lime water to drink: and the production of vomiting.

ANTIMONIALS.

Symptoms.—Choleraic discharges from the stomach and bowels, gastro-enteritis.

Treatment.—Diluents and emollients, tannin, tincture of cinchona, and decoctions of drugs containing tannin in order to form an insoluble combination.

For the hyperemesis, effervescent mixtures with opium; tannin, cracked ice; ether, tincture of castor.

NITRATE OF SILVER.

Symptoms.—Cauterization of the mucous membranes, coma, and convulsions.

Treatment.—Milk and albumen; common salt with a large quantity of water. See also under Chronic Poisoning, below.

ARSENIC.

Arsenic acid (rat poison), arsenious acid and its combinations, orpiment, realgar, Paris green, and various arsenical pigments.

Symptoms.—An astringent sensation in the mouth, pain in the epigastrium, vomiting and diarrhœa, sometimes bloody; great thirst, coldness of the skin with a subjective sensation of heat, great anxiety, dyspnœa, syncope, symptoms resembling the asphyctic stage of cholera, delirium, convulsions. Death results from paralysis of the cardiac motor nerves and of the posterior gray matter of the spinal cord.

Treatment.—Freshly prepared hydrated oxide of iron or calcined magnesia. When necessary, emetics and cathartics (Glauber's salt). Further treatment is symptomatic. See also under Chronic Poisoning, below.

LEAD.

Sugar of lead, white lead, litharge, red lead, etc. Acute poisoning may occur from the use of new, poorly glazed pots in which acids or grease may have been kept.

Symptoms.—A sensation of constriction in the throat, burning pains in the abdomen, vomiting, diarrhœa, collapse; sometimes instead of diarrhœa there is obstinate constipation with retraction of the abdominal wall, and colic.

Treatment.—White of egg, milk, an emetic of sulphate of zinc, laxatives (castor-oil emulsion). Antidotes: sulphur, sulphate of sodium, potassium, or magnesium (forming a sulphate of lead, which is also poisonous and must be removed as speedily as possible). In case of necessity, alum, phosphates, or dilute sulphuric acid. Opiates are to be given only after thorough emptying of the stomach and intestines. See also under Chronic Poisoning, below.

IODINE.

Acute iodism, occurring sometimes after the injection of large quantities of tincture of iodine into ovarian and other cysts.

Symptoms.—Vomiting, pallor and cyanosis of the skin, collapse; a small and very rapid pulse; sometimes dyspnœa, suppression of urine, and hæmoglobinuria; albuminuria, redness of the skin; sore throat, coryza, conjunctivitis, frontal headache, skin eruptions.

Treatment.—Discontinuance of the iodine; albumen, stimulants; symptomatic treatment. See also under Chronic Poisoning, below.

IODOFORM.

Symptoms.—Headache, vertigo, sleeplessness; pruritus, icterus; singultus, clonic spasms; peculiar psychic manifestations (maniacal attacks, refusal of food, mania of persecution); constipation followed by incontinence of fæces. In severe cases, convulsions, profound coma, very small frequent pulse. Iodine may be detected in the urine.

Treatment is symptomatic: Stimulants, baths, alkalies; atropine, morphine hypodermically; forcible feeding if necessary, and measures to induce a copious secretion of urine.

BROMIDE OF POTASSIUM AND OF SODIUM.

Symptoms, due to a cumulative action: Anæsthesia of the skin and mucous membranes, even of the cornea; sore throat, headache, loss of memory, sopor, dulness of the senses, an

acneiform eruption, pallor of the entire surface, great general weakness, incontinence of urine and of fæces.

Treatment.— Discontinuance of the remedy, baths, vapor baths, purgatives, diuretics and diaphoretics, a nutritious liquid diet, enemas of water, caffeiné.

COPPER SALTS.

Symptoms.— Gastro-enteritis with vomiting of greenish masses having an odor of copper, colic and tenesmus, delirium and convulsions.

Treatment.—Diluents (avoid the use of oils and vinegar), large quantities of white of egg, milk, calcined magnesia, grape sugar, honey, iron filings, ferrocyanide of potassium in 15-grain doses, and a thin mixture of iron filings and sulphur in syrup.

PHOSPHORUS.

Symptoms.—Marked gastro-enteritis, though not invariably; great thirst, collapse, jaundice; the vomited matters and stools smell of garlic and are luminous in the dark.

Treatment.—Stomach-pump, emetics, especially sulphate of copper; the latter is given first as an emetic and later in smaller doses; or carbonate of copper in doses of gr. iv.–viij. in water every half-hour, followed by two teaspoonfuls of vinegar in water. In the intervals cold drinks or water ices, and after a few hours another emetic dose of sulphate of copper. No oily laxatives or enemata should be given. Albumen, mucilaginous mixtures, calcined magnesia, chloride of lime, and especially oil of turpentine. See also Chronic Poisoning, below.

Fats, milk, and alcoholics should not be given.

When, in cases of burns, phosphorus is left behind in the skin, it should be removed by means of ether, or the burn is to be washed first with pure water and then with a five-per-cent solution of soda or ammonia.

MERCURY.

A. Escharotic Mercurial Preparations, especially Corrosive Sublimate.

Symptoms.—A burning and contraction in the throat, severe pain in the abdomen, choking, profuse vomiting sometimes bloody, diarrhœa, tenesmus, collapse, and convulsions.

Treatment.—First an emetic; then magnesia, white of egg, flour and water, milk, sugar water, the fresh precipitate obtained by adding alkaline sulphates to a solution of ferrous sulphate.

B. Acute Mercurialism.

Symptoms.—A catarrhal or ulcerated condition of the buccal mucous membrane, sore throat, ptyalism, loosening of the teeth, fetor of the breath, nausea, fever.

Treatment.—If blue ointment has been used, every trace of it must be carefully removed from the skin by means of soap and water; and then resolvents are to be given, especially warm baths, sarsaparilla, iodide of potassium; the stomatitis and salivation must also be treated. (See Mercurialism, under Chronic Poisoning, below.)

SULPHURATED POTASSA.

Acts as a poison by setting free sulphuretted hydrogen (see Gaseous Poisons).

Symptoms.—Gastritis, vomiting, vertigo, collapse, paralysis of the heart and of respiration.

Treatment.—Mucilaginous remedies, milk, chlorine, chloride of lime, charcoal to absorb the sulphuretted hydrogen; artificial respiration.

ZINC AND TIN SALTS.

Symptoms.—Nausea, vomiting, diarrhœa, great thirst, trembling of the limbs, gastro-enteritis, abdominal pain, collapse.

Treatment.—White of egg, milk, tannin, bicarbonate of sodium. See also under Chronic Poisoning.

II. ORGANIC POISONS.

1. Animal Poisons.

CANTHARIDES.

Symptoms.—Severe, often bloody vomiting, excessive pain in the abdomen, spasm of the throat, salivation, strangury, bloody urine, sexual excitement, numbness of the sensorium.

Treatment.—Emetics and laxatives, then mucilaginous (but not oily) substances; small doses of camphor with opium; poultices and leeches over the neighborhood of the kidneys.

CHEESE, SAUSAGE, FLESH, AND FISH POISONS.

Symptoms.—Choleraic vomiting and diarrhœa, colic (sometimes, however, constipation), difficulty in swallowing, hoarseness, ptosis with disturbances of vision, a tendency to fall, precordial anxiety, delirium, convulsions, petechiæ, death, or a very tedious convalescence.

Treatment.—The poison must first of all be removed from the system by emetics and purgatives, and then the treatment must be stimulant and symptomatic; solution of anisated ammonia, camphor, oil of turpentine, strong black coffee, remedies to quiet the vomiting, mustard plasters to the stomach (strychnine or vegetable acids?).

SNAKE BITE.

Symptoms.—Vertigo, chill, physical depression, coldness of the extremities, dilatation of the pupils, paralysis, dyspnœa, dysphagia, vomiting, icterus, tendency to extravasations of blood, marked local swelling, formation of abscess, or even gangrene.

Treatment.—Ligature around the wounded limb, suction on the wound, incision followed by cupping, the actual cautery, caustic potassa, solution of caustic ammonia locally applied, a few drops in water internally, and 30 drops diluted with from 1 to 4 parts of water injected into a vein; permanganate of potassium subcutaneously; strychnine, hot alcoholic liquors, strong alcohol in large amounts.

INSECT STINGS.

Bites from bees, spiders, scorpions, centipedes, etc.

Treatment.— Expression and suction of the wound; neutralization of the acid poison by means of water of ammonia internally and locally, lime water, carbolized oil. For the stings of bees and mosquitoes especially, painting the parts with silicate of potassium or oil of sassafras; cold compresses.

2. Poisonous Organic Acids and their Combinations.

OXALIC ACID.

Symptoms.—It acts locally as a caustic when concentrated, causing constriction in the throat, vomiting, sometimes bloody, and colic; and narcotic on the brain and spinal cord, producing stupor, trembling of the extremities, tetanic convulsions, dyspnœa, and paralysis of the heart.

Treatment.—Lime and lime salts, chalk, egg shells, and magnesia are antidotes; but sodium, potassium, and ammonium form poisonous salts with oxalic acid. Emetics should be given when vomiting does not occur spontaneously. Stimulants.

CARBOLIC ACID.

Substances that act similarly are: tar, creasote, anilin, nitrobenzol, picric acid, and artificial oil of bitter almonds.

Symptoms.—Relatively small amounts (gr. xij. at a dose or ʒss. a day) cause depression, headache, vertigo, cold sweats, eructations, vomiting, strangury, and even nephritis. In children, restlessness, elevation of temperature, clonic spasms, tetanoid attacks, and glottic spasm, and a peculiar condition of collapse.

Large caustic doses cause vomiting, syncope, anæsthesia, disorders of consciousness resembling drunkenness, vertigo, delirium, pulselessness, rapidly occurring collapse, a tarry odor of the breath, olive-green coloration of the urine, local caustic action in the mouth and throat.

Treatment.—The milder symptoms disappear spontaneously upon the discontinuance of the remedy.

Large amounts taken into the stomach demand the employment of the stomach pump, followed by emollients, albuminous substances, milk, and especially olive or almond oil with a little castor oil. Sulphate of sodium is the approved antidote in doses of 75 grains a day for adults and 30 to 45 grains for children, or else saccharated lime. In protracted cases, sulphuric acid mixture may be given in doses of a tablespoonful every hour. Stimulants by the rectum. Cutaneous irritants.

HYDROCYANIC ACID AND NITROBENZIN.

See Asphyxiating Poisons, below.

3. Vegetable and Organo-Chemical Poisons.

A. ACRID POISONS.

1. With especially irritating action: Squill, savine, mezereum, euphorbium, chelidonium, various of the ranunculaceæ, anemone, strong peppers and mustard.

2. With irritating and strongly purgative action: croton oil, scammony, elaterium, gamboge, colocynth, bryonia.

3. With irritating, but especially narcotic, action (see Nerve Poisons): colchicum, lobelia, privet, veratrum, hellebore, savadilla, staphisagria, pulsatilla, rhus toxicodendron, delphinium, oleander, the bark and flowers of laburnum.

Symptoms.—A raw, burning sensation in the mouth and throat, gastro-enteritis, swelling of the mucous membranes with which the substance was in contact; vomiting, diarrhœa, tenesmus.

Treatment.—Emetics, laxatives, emollients; ice, local abstraction of blood; opium, tannin. (*Conf.* Toxic Gastritis.)

B. MUSCLE AND NERVE POISONS (NARCOTICS).

1. Cerebral Poisons.

OPIUM, MORPHINE.

Symptoms.—Headache, nausea, vomiting, a sensation of extraordinary fatigue, anxiety, wandering talk, maniacal attacks; sopor, delirium, subsultus tendinum, occasionally convulsions; the pupils are strongly contracted, pulse and breathing slow and irregular, skin covered with sweat.

Treatment.—Powerful emetics or the stomach pump, even after several hours have elapsed. Antidotes are: Tannin in repeated small doses, atropine subcutaneously, caffeine (black coffee); counter-irritants, artificial respiration. Symptomatic treatment, the patient should be kept continuously walking, cold douches, stimulants, especially coffee, and camphor subcutaneously. The administration of vegetable acids (not,

however, until the stomach has been emptied of the opium) lessens the severity of the symptoms. See also under Chronic Poisoning, below.

HASHISH.

Symptoms.—In severe cases, convulsions with difficulty in respiration, dilated pupils.

Treatment.—The same as opium poisoning, *q.v.*

ERGOT.

Symptoms.—Nausea, vomiting, colic, diarrhœa; vertigo, headache, muscular weakness, a slow pusle; in severe cases, sopor, respiratory disturbances.

Treatment.—Emetics, cathartics, tannin, stimulants (ether, camphor, black coffee). See also under Chronic Poisoning, below.

POISONOUS MUSHROOMS AND TOADSTOOLS.

Symptoms.—Poisonous mushrooms cause nausea, vomiting, diarrhœa, headache, coma, but especially hæmoglobinuria and hæmatogenous jaundice. Spoiled edible mushrooms produce choleraic symptoms. Toadstools cause gastric symptoms, diarrhœa, psychic disturbances, delirium, epileptiform and tetanic convulsions, a slow pulse, dilated pupils, disturbances of vision, salivation, sopor.

Treatment.—Active emetics, castor oil, croton oil, tannin, stimulants. Atropine in small doses, best given subcutaneously, is an antidote especially in toadstool poisoning.

ALCOHOL.

Symptoms.—Loss of consciousness, anæsthesia, dilated or contracted pupils usually not responsive to light, small slow pulse, cool clammy skin, vomiting, stertorous respiration; instead of coma, there are sometimes clonic convulsions and delirium.

Treatment.—Baths with douching, counter-irritation, and according to the indications local bleeding or even venesection, cold compresses and douches, derivatives. (*Conf.* Cerebral Hyperæmia, above.)

Strong black coffee with lemon juice; water of ammonia by inhalation and from 2 to 10 drops in water internally, or aromatic spirit of ammonia or solution of anisated ammonia; carbonic-acid water.

For the headache and depression following a debauch: Carbonic-acid water, strong black coffee, sardellen, Russian salad, one glass of good beer, water of ammonia. See Delirium Tremens and Alcoholic Dyscrasia, below.

2. Cerebro-Spinal Poisons.

CHLORAL.

Symptoms.—Collapse, cold sweat, slow and stertorous breathing, injection of the conjunctivæ, contraction of the pupils, pallor of the lips, dropping of the chin, at first strong and slow, later rapid and very small pulse.

Treatment.—Stomach pump, artificial respiration, rubbing and the application of great heat to the skin; douching with cold water. For the cardiac paralysis, strong coffee, subcutaneous injection of strychnine in an initial dose of gr. $\frac{1}{20}$, and repeated in smaller doses; inhalation of nitrite of amyl. Caffeine, musk, camphor, ether; faradization of the phrenic nerve; transfusion. See also under Chronic Poisoning, below.

BELLADONNA (ATROPINE) AND STRAMONIUM, HYOSCYAMUS.

Symptoms.—Dilatation of the pupils, disturbance of vision (blindness), increased rapidity of the pulse and respiration, great dryness of the throat and skin, a condition resembling drunkenness with delirium, jactitation, and finally sopor. Sometimes vomiting, colic, diarrhœa (from the ingestion of the fruit). Hyoscyamus is said to cause greater stupor, sopor with delirium, and hoarseness.

Treatment.—Emptying of the stomach, tannin, animal charcoal, iodine, morphine subcutaneously or physostigmine. There appears to be a decided antagonism between opium and the solanaceæ, belladonna, stramonium, and hyoscyamus, they being mutually antidotal. Jaborandi (pilocarpine) may also be given as an antidote; large quantities of alcohol; inhalation of chloroform; symptomatic treatment.

SOLANIN.

A glucoside found in Solanum nigrum (garden nightshade) and Dulcamara (bittersweet), and also in unripe and diseased potatoes and in the potato plant.

Symptoms.—Stupor, dilated pupils, very rapid pulse (pulselessness), dyspnœa, convulsions, great nausea, vomiting, dry and itching skin.

Treatment.—Tannin, emetics and cathartics, stimulants; the further treatment is symptomatic; sometimes opium is indicated.

NICOTINE.

The poisonous ingredients of tobacco smoke are: salts of nicotine, sulphuretted hydrogen, and hydrocyanic acid.

Symptoms.—Vertigo, headache, sleepiness and mental dulness, a feeling of great fatigue and of misery, nausea, vomiting; contracted pupils, cold sweat, collapse, clonic convulsions, marked diuresis.

Treatment.—Tannin is to be given as an antidote; the stomach pump may be needed; symptomatic treatment; artificial respiration. See under Chronic Poisoning, below.

3. Spinal Poisons.

CONIUM.

Found in numerous varieties of hemlock, in Cicuta maculata, also in many varieties of Œnanthe, and in wild rosemary (Ledum palustre) used sometimes by beer brewers.

Symptoms.—Paresis of the voluntary and respiratory muscles, preceded sometimes by convulsions.

Treatment.—Removal of the poison; tannin, strychnine; artificial respiration; stimulants.

In this class belong also lobelia, Taxus baccata, and many poisonous fungi.

STRYCHNOS NUX VOMICA.

The alkaloids strychnine and brucine are found also in Strychnos Ignatii, in false Angostura bark, snakewood (Strychnos colubrina), and Java arrow poison.

Symptoms.—Rigidity, tension, and spasms of the muscles, tetanus and consequent dyspnœa, anxiety and restlessness,

cyanosis, dilated pupils; consciousness is preserved until near the end. The slightest external irritation suffices to excite an attack.

Treatment.—Removal of the poison by emetics, castor and croton oil; tannin, tincture of iodine (10 to 20 drops in water, often repeated), injections of morphine, chloral (*conf.* Nux Vomica, in Part II.), monobromide of camphor (3 i.–iss. in divided doses); also extract of physostigma, inhalations of nitrite of amyl, ether, chloroform; the constant galvanic current to the medulla, artificial respiration.

COCCULUS INDICUS (PICROTOXIN).

Symptoms are similar to those of strychnine poisoning, but more choreic in character; also vomiting, gastro-enteritis; coma.

Treatment is the same as that of strychnine poisoning.

CURARE.

Woorara, Urali, Ticunas, Indian arrow poison.

It causes paralysis. The antidote is strychnine, and in addition stimulants are called for, and artificial respiration. In the case of a poisoned wound, a ligature should be drawn tightly around the limb.

PHYSOSTIGMA AND PHYSOSTIGMINE.

Symptoms.—Vomiting, excessive fatigue amounting even to paralysis, passage of urine and fæces (strong peristalsis), profuse secretion of saliva and of sweat, contraction of the pupils, dyspnœa, gradual slowing of the pulse and fall of temperature.

Treatment.—Emetics; strychnine or atropine as an antidote; artificial respiration, strong stimulation, warmth; the further treatment is symptomatic.

4. Heart Poisons.

ACONITE.

Symptoms.—Burning pain in the throat, formication in the tongue, pain in the stomach, marked oppression and difficult respiration, muscular weakness amounting even to paralysis; dilated pupils, coldness and diminished sensibility of the skin; slowing and final arrest of the heart's action.

Treatment.—Emetics and cathartics. Tannin and iodine. Heart stimulants.

DIGITALIS.

Symptoms.—Gastric disturbances, dryness in the throat, loss of appetite, nausea, vomiting, borborygmi and colic, sometimes diarrhœa; lowering of the intra-vascular pressure, irregular action of the heart, threatening paralysis of the heart; collapse.

Treatment.—Emetics in certain cases; tannin; powerful stimulation by means of camphor, ether, wine, coffee; counter-irritation of the skin; ammonia (intra-venous injections?); treatment of the collapse.

VERATRUM.

Including white, black, and green hellebore, savadilla, and stavesacre.

Symptoms.—Severe vomiting sometimes bloody, hiccough, diarrhœa, burning pain in the stomach; sinking of the pulse and temperature, slow respiration; twitchings, clonic spasms; loss of consciousness, collapse.

Treatment.—Tannin, stimulants, solution of anisated ammonia, emollients, opium; symptomatic treatment.

COLCHICUM.

Symptoms.—Nausea and persistent vomiting, colic, diarrhœa with tenesmus, reduced frequency of the pulse, great muscular weakness, disturbance of vision, collapse, vertigo; but no loss of consciousness, seldom convulsions and coma.

Treatment.—Emptying the stomach, if the drug itself has not already brought about vomiting and diarrhœa. Tannin is the antidote, and after its administration an evacuating, stimulating, and symptomatic treatment is called for. Ice, opium.

5. Asphyxiating Poisons.

HYDROCYANIC ACID.

Including cyanate of potassium and other cyanates. Prussic acid is contained in bitter almonds, cherry-laurel leaves, and the kernels of cherries, peaches, apricots, and plums.

Symptoms.—Great dyspnœa and muscular weakness, cool extremities, unconsciousness, dilated pupils, convulsions, cyanosis; trismus; odor of bitter almonds in the breath. The poison acts by inducing changes in the blood, and also as an asphyxiating agent by paralyzing the respiratory centre.

Treatment.—Emptying the stomach (stomach pump); atropine subcutaneously, ammonia inhaled, taken by the mouth in water, and injected into the veins; cold douching while the patient is in a warm bath; injections of camphor or ether; artificial respiration is necessary.

NITROBENZIN (ANILIN AND ANILIN DYES).

Symptoms.—A strong odor of bitter almonds; dizziness at first; the skin soon becomes blue increasing to a deep cyanosis; dyspnœa; disturbances of consciousness passing into sopor.

Treatment.—Stomach pump; artificial respiration; stimulants; transfusion. To this group of asphyxiating substances belong also the following gaseous poisons.

B. Gaseous Poisons.

HYDROGEN SULPHIDE, SULPHURETTED HYDROGEN.

Symptoms.—Nausea, general weakness, anxiety; slowness and intermission of the pulse; rapidity followed by cessation of respiration; dilated pupils; convulsions. The poison acts by withdrawing oxygen from the blood, which becomes of a dirty green color. Small doses stimulate the regulator nerves of the heart, larger doses (directly or through withdrawal of oxygen?) paralyze the musculo-motor apparatus.

Treatment.—Cold douching to stimulate respiration, artificial respiration; inhalation of weak chlorine gas which breaks up the hydrogen sulphide; chloral for the convulsions; intravenous injection of ammonia; if necessary an emetic, of which the best is apomorphine subcutaneously; internally large doses of a weak solution of iodine; symptomatic treatment.

SEWER-GAS, MEPHITIS.

This is either simply hydrogen sulphide or a mixture of this with sulphide of ammonium, ammonia, and carbonic acid. The symptoms and treatment are the same as those of hydrogen sulphide.

CARBONIC OXIDE, CHOKE-DAMP, AND ILLUMINATING GAS.

The latter is a mixture of carbonic oxide, choke-damp, hydrogen, carbonic acid, and other gases.

Symptoms.—Headache, depression, involuntary discharges, vertigo, dulness, delirium, anæsthesia, convulsions, intermittent gasping respiration, weak heart action, cyanosis, and suspended respiration.

These gases act by deoxidizing the blood-corpuscles (the blood is a bright cherry red), narcotizing the cerebrum, and paralyzing the vaso-motor nerves.

Treatment.—Fresh air, artificial respiration, cold douching, cutaneous irritation, transfusion; subcutaneous injections of ergot; stimulants, especially subcutaneous injections of camphorated oil in doses of 5 or 6 syringefuls (15 minims each) a day.

CHLORINE.

Symptoms.—Great irritation causing sneezing and coughing, attacks of asphyxia, sore throat, coryza, bronchitis.

Prophylaxis.—Holding a sponge wet with alcohol before the mouth.

Treatment.—Breathing warm aqueous vapor; inhalations, practised with care, of ammonia or hydrogen sulphide; white of egg taken in water or milk.

CARBONIC ACID.

Symptoms.—Rapid respiration passing its extreme dyspnœa, headache, vertigo, benumbing of the senses; loss of sight and hearing; dilatation of the pupils; general convulsions (irritation of the convulsive centre in the pons); finally general asphyxia. The pulse, which is unchanged or slightly quickened when small quantities are inhaled, is slowed in consequence of the extreme irritation of the vagus centre, with increased intension.

Treatment.—Fresh air (oxygen), stimulants; symptomatic treatment.

AMMONIA.

This gas is not directly poisonous, but is irrespirable, causes reflex spasm of the glottis, and may lead to death, even

after several days, in consequence of extensive inflammation of the mucous membrane of the respiratory tract.

ETHER AND CHLOROFORM.

Symptoms.—Death comes either through the heart, from sudden stoppage in consequence of paralysis of the motor apparatus, or as a result of paralysis of the respiratory centre in the medulla oblongata; it may occur suddenly or gradually, the breathing becoming more and more difficult and superficial, with symptoms of carbonic-acid poisoning. Most frequently respiration is mechanically interfered with in consequence of dropping back of the tongue and epiglottis.

Treatment.—Drawing out the tongue, or (which is to the same effect) pushing forward the lower jaw; the mouth may be pried and held open with a gag, and then the finger is introduced and hooked around the epiglottis, drawing it forward. Dashing cold water on the chest and face, tickling the nose or the mucous membrane of the larynx; artificial respiration, the arms being first drawn strongly upward and then brought down and pressed forcibly on the chest, the head meanwhile being the lowest point of the body; the chest may be alternately strongly compressed and then suddenly relaxed; or electricity may be applied to the phrenic nerves by means of broad flat electrodes pressed against the neck on each side of the larynx. Injections of strychnine, inhalation of nitrite of amyl, stimulants, cutaneous irritation. Prompt tracheotomy. In case of stoppage of the heart, the chest should be struck over the cardiac region; or possibly electropuncture of the heart wall (?).

FUMES OF HYDROCYANIC ACID.

See Hydrocyanic Acid, above.

Chronic Poisoning.

NITRATE OF SILVER (ARGYRIA).

Symptoms.—A grayish discoloration of the skin, general depression, dizziness with weakness of memory, contracture of the muscles of the neck; pharyngeal and bronchial catarrh, weakness of vision, chronic gastro-intestinal catarrh, albuminuria (nephritis).

Treatment.—Discontinuance of the remedy; nourishing food. See under Acute Poisoning, above.

ARSENIC.

Symptoms.—Gradual emaciaction with gastric disturbances, colicky pains, great thirst, vomiting or diarrhœa; conjunctivitis (after long use of Fowler's solution); mental dulness, melancholia; a dry pallid skin, cutaneous eruption; fever; depression of spirits; trembling of the limbs, paretic weakness, arthralgia, convulsions.

Treatment.—Sulphur waters, iodide of potassium, cautiously administered; chloride of ammonium as a specific; vapor baths; tonics, especially iron and quinine; symptomatic treatment. See also under Acute Poisoning.

LEAD.

a. Lead Colic.—See under Colic, and also Acute Poisoning by Lead.

b. Lead Arthralgia, etc.—Symptoms: Steady or remittent pains, especially of the flexors of the knee, accompanied, when long continued, by atrophy of the affected parts; saturnine tremor, contractures, anæsthesia, eclampsia, and paralysis of the extensor muscles, especially of the hand (wrist-drop).

Treatment: Cathartics, warm baths with sulphide of potassium; iodide and bromide of potassium; narcotics, strychnine; galvanization, local and of the sympathetic; cold douches, tonics.

c. Saturnine Encephalopathia with Amaurosis (and Eclampsia). Symptoms: Sudden attack of severe headache, great mental restlessness, convulsions, delirium, coma.

Treatment: Expectant and symptomatic; tepid baths with douching; narcotics, stimulants, iodide of potassium.

d. Saturnine Tabes.—Treatment: Iron, sulphur baths; strychnine, electricity long continued; cathartics, good food, and pure fresh air.

MERCURY (MERCURIAL TREMOR AHD CACHEXIA).

Treatment.—Diuretics and diaphoretics, small doses of iodide of potassium, vapor baths, sulphur baths (Aachen,

Baden bei Wien, Neundorf); pure fresh air, easily digestible nourishing food. See under Acute Poisoning, above.

ZINC.

Symptoms.— Digestive disturbances, marasmus, œdema resulting from hydræmia.

Treatment.—The only treatment consists in the withdrawal of the source of the poisoning, when, under a suitable tonic regimen, a cure usually occurs very speedily. See also Acute Poisoning, above.

PHOSPHORUS.

Symptoms.—Gastric disturbances, eructations of gas with an odor of phosphorus, vertigo, physical depression, an unhealthy appearance; bronchitis, tuberculosis; severe tearing pains; osteo-periosteitis with necrosis of the lower jaw.

Treatment.—Stimulants (camphor, musk), nourishing food, tonics. See also Phosphorus, under Acute Poisoning, above.

IODINE (CHRONIC IODISM).

Symptoms.—Complete anorexia and digestive disturbances; coryza and the other symptoms of acute iodism (see above); colic with diarrhœa; hoarseness, bronchitis, hæmoptysis. Nervous symptoms, such as restlessness, excitability, headache, insomnia, trembling of the limbs, palpitation, general debility. Cutaneous eruption (acne, erythema, especially erythema nodosum). Great emaciation, atrophy of the glandular organs.

Treatment.—Discontinuance of the drug; cautious tonic treatment. Sulphanilic acid (ʒ iss.) is said to overcome speedily the symptoms of chronic iodine poisoning.

ALCOHOL (DELIRIUM TREMENS).

Treatment.—Opium in large doses, chloroform; chloral, in doses of 38 to 45 grains in wine, every half-hour until the excitement is overcome, more active if combined with morphine; bromide of potassium (30 grains) with tincture of digitalis (30 minims) every two hours; cold douching. The straitjacket should not be used. Alcohol cannot, even in fever, be

entirely dispensed with. See also under Acute Poisoning, above.

ALCOHOL (ALCOHOLISM).

Treatment.—Gradual withdrawal of the alcohol and treatment of the principal symptoms and organic affections. For the gastric catarrh: Bitters (blessed thistle, cinchona, nux vomica), alkaline carbonates, subnitrate of bismuth, acetate of zinc, digitalis, tartar emetic, nitrate of silver, opium. For the tremor: Fowler's solution (subcutaneously), fusel oil, six drops in sugar three times a day. For the most urgent nervous symptoms (convulsions, hyperæsthesia, delirium, hallucinations): chloral, morphine, cold douching. For the attacks of syncope, etc.: camphor; blood-letting is to be avoided.

OPIUM AND HASHISH.

Symptoms.—Moderate use produces no lasting consequences, but the abuse of these drugs may lead to gastric catarrh, scorbutic stomatitis, extreme emaciation, trembling of the extremities, mental hebetude and hallucinations. Hashish causes physical weakness and incapacity for mental labor.

Treatment.—Possibly stimulant and symptomatic. See Acute Poisoning, above.

MORPHINE.

Symptoms.—Pallor, hyperidrosis, cutaneous efflorescence, diplopia, contraction or inequality of the pupils, insomnia, neuralgias and numerous other nervous disturbances, albuminuria, intermittent fever, and a form of chronic delirium tremens without excitement.

Treatment.—Sudden withdrawal (in asylum practice), but with great caution, as symptoms of collapse may be thus induced; when the symptoms resulting from abstinence are excessive, an occasional injection of morphine may have to be given. In the first days of treatment, strong wine is of service. The use of cocaine in the treatment of the morphine habit has been rightly abandoned because of the danger of substituting cocainism for the original trouble. See Opium, under Acute Poisoning, above.

COCAINE.

For the symptoms and treatment of cocainism see under Cocaine, in Part II.

CHLORAL.

Symptoms.—Conjunctivitis, contraction of the pupils, skin eruptions, especially erythema and a sensation of heat called forth by the ingestion of alcohol or even of warm food, dyspnœic attacks.

Treatment.—Discontinuance of the drug; tonics. See Acute Poisoning, above.

TOBACCO.

Symptoms.—Dyspepsia, pharyngeal and laryngeal catarrh, (conjunctivitis); palpitation of the heart, trembling of the limbs; a hypochondriacal disposition, psychical changes (?), sometimes dimness of vision or amaurosis.

Treatment.—Abstinence from tobacco, treatment of the special symptoms. See under Acute Poisoning, above.

ERGOT.

Symptoms.— Nausea, eructations, vomiting, diarrhœa; gastro-enteritis (hemorrhagic); vertigo, extreme debility; formication, numbness of the hands and feet; wandering pains; slight muscular twitchings even up to epileptiform attacks, tonic contractures; anæsthesia of the skin, or an erysipelatous swelling with severe pains of one or more of the extremities with subsequent gangrene (gangrenous ergotism).

Treatment.—Symptomatic; emetics and cathartics; tannin; stimulants and tonics. For the spasmodic and convulsive symptoms: Narcotics and anæsthetics during the attacks; cathartics (anthelmintics), tonics, and nourishing diet without rye or corn meal. See also under Acute Poisoning, above.

BISULPHIDE OF CARBON.

Poisoning occurs through inhalation of the vapors, especially in the manufacture of caoutchouc.

Symptoms.— Compressive headache, mental dulness, some-

times preceded by transitory excitement, loss of muscular power, of memory, and of vision, tinnitus aurium, muscular twitchings and spasms, disturbances of digestion, a melancholic disposition.

Treatment.—Permanent withdrawal from the injurious influences. Phosphorus in doses of gr. $\frac{1}{60}$ to $\frac{1}{12}$ a day. For paresis, the constant current.

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